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PLANNING A LESSON

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PREFACE

Lessons cannot be given off-hand. There must be some preliminary preparation. Even the best teachers never reach the point where preparation for the day's work becomes unnecessary. So before he enters into a classroom every teacher prepares himself in some manner or other for the work he proposes to do there. This is lesson-planning. This planning may be committed to writing or may be stored in memory. It may be a detailed plan describing every step the teacher will take in giving a particular lesson or it may note only the broad outlines to be followed in the process. An experienced teacher familiar with the grounds will not or perhaps need not write out the lesson-notes fully; but for young teachers it is always helpful to draw up the notes elaborately and commit them to writing. The older teacher ma no doubt, be able to keep a class in order and teach them son thing with a minimum of preparation; but even in his case best work will be done only when he has planned as carefully the young teacher for whom the need of preparation is apparent. Well-prepared lesson-notes are valuable for m. reasons: Firstly, they create confidence in the teacher; with n fully drawn up he can face the class squarely. Secondly prepared well in advance the teacher learns how to organise materials as well as his thought-processes in relation to particular lesson; and thirdly, they act as a check on the tea by keeping him on the track. There are many other good rea why young teachers should know how to plan lessons. In in every training college this topic forms an important part of t course and every teacher-in-training has to learn to write notes lessons.

There are several good books on this subject but not all them are easily accessible to the Indian students. So a need felt for a handy volume which, while discussing the princip

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underlying lesson-planning, would also give practical help to teachers in drawing up notes of lessons on various school subjects. The present work is intended to serve this purpose.

The book is divided into two parts. The first part deals with the various principles involved in lesson-planning. In discussing these principles we have tried to be as brief as possible, for, an elaborate discussion would be out of place here. It is to be remembered that this monograph is intended to be only a guide to lesson-planning rather than a complete treatise on the methods of teaching different subjects. For a thorough discussion of these methods appropriate works should be consulted. The second part of the book consists of twenty lesson-notes on different school subjects. These lesson-notes are intended to illustrate the principles discussed in the first part which by itself may not always appear to be explicit without constant reference to the notes in the latter part of the book. These notes have been mainly llected from the work of students-in-training and based lessons actually delivered in the classrooms. They have cessarily been edited. Our object in using these lesson-notes s been twofold ; firstly we did not want to give theoretical notes hich could not be used in the classroom ; and secondly, it is not purpose to give notes which may be looked upon as being eals' or 'models.' These lesson-notes are intended to serve rely as guides and not models. They must not be copied nor lowed blindly. Too often there is a tendency, specially among ned teachers, to develop an extremely formal attitude towards on-notes and to make a fetish of such notes. This attitude cannot but too strongly condemn. A perusal of the following es will reveal that we have all along tried to maintain a broad d an informal view on the subject and we want those who will this book to maintain a similar attitude.

The book is more or less a compilation. We have not sitated to borrow materials from others. A list of the books ich we have used in preparing this present work will be found he end; to the authors of these we freely acknowledge our

debt. Those who want to study the subject more thoroughly may consult them. In this connection we also thank the writers of the lesson-notes we have used, who for obvious reasons must remain anonymous.

My own part in writing the book has been mainly in planning and editing; the greater part of writing was done by my colleague Mr. S. C. Dutt, Head Master of Collins Institute and the Honorary Supervisor of this department, and to him the credit for producing the book is mainly due. We are indebted to our colleague Mr. Nagendranath Majumdar, M.A., B.T. for revising the manuscript and for offering many valuable suggestions.

TEACHERS' TRAINING DEPARTMENT
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PLANNING A LESSON

I

PLANNING : ITS NATURE AND TECHNIQUE

Necessity for planning—In education as in other fields of human endeavours a careful organization of materials and activities is essential. An engineer entrusted with the construction of a railroad first examines in a general way the lay of the land, mountains and valleys, rivers and gorges, populated and vacant regions. On the basis of this preliminary observation he plans the general route of the line and then undertakes the accurate planning of details furlong by furlong. The educational engineer has, likewise, to take a broad view of the entire field of human activities and of the social heritage of the community it is his privilege to serve, so that he may lay out in a general way the contents of the course of education to be followed, its sequence and objectives. And then keeping in perspective the total learning contemplated in the course he plans for day to day instruction.

The lesson plan—Planning for day to day instruction centres around a device called the *lesson-plan*. According to Monroe, it " is the name of a statement of the things a teacher proposes to do during the period he spends with his class." Bossing objects to this definition on the ground that " it focusses attention upon the teacher rather than the pupil as central in the daily classroom situation. " Learning is the result of the reactions of the pupil to certain specific situation. This being so, it is the pupil who should actively apply himself to his work. The teacher's business is merely to create in him the mind-set or the desire to learn In accordance with this conception of learning the teacher shoubly in drawing up his lesson-plan, (1) state his aim in terms of actuas

achievements by pupils, (2) adopt such processes and procedures as recognise pupil-activity as the basis of learning, (3) and so organise activities that the pupil may be in the foreground and the teacher in the background as the director of such activities.

Outline of subject-matter—A lesson-plan is primarily concerned with the organisation of subject-matter. The amount of subject matter that is covered in one school-period is called a *lesson-unit.*

It has already been said that in planning for each day's work the teacher must keep in perspective the total learning contemplated in the entire course of prescribed studies. Modern educators insist on the organization of subject-matter into significant units, each lesson-unit growing out of the previous one and reaching forward to the next. Such inter-related lesson-units centering around a purposeful activity or a meaningful experience form what is called a *method-unit, long-unit* or *method-whole*. To give an example from grammar : "Tense of Verbs" is too big a topic to be covered in one period. So it cannot be a lesson-unit. It must be treated in segments, each of which can be covered in a day and is meaningful to the pupils. The following unit-organisation may be suggested for the purpose :—

Scheme of Lessons

Method-whole—A study of tense forms and their implications in relation to the ideas of time and action.

Lesson-units—(*a*) Forms and uses of the Indefinite Tenses
(*b*) ,, Continuous ,,
(*c*) ,, Perfect ,,
(*d*) ,, Perfect Continuous Tenses.

Sometimes it is necessary to combine several isolated lesson-units into one long-unit providing a meaningful experience; as for example, the theorems one, two and three of Euclid receive added significance when brought together under the head 'Properties of supplementary angles.' It may thus be taken up as the

Method-whole or *Method-unit*, each of the three theorems forming a lesson-unit. This way of organising subject-matter into inter-related and significant units, large and small, helps in many ways; firstly, it always keeps the goal in view and thus adds interest to the study; secondly, it recognises the stages to be covered before the goal can be reached; and finally, it helps to avoid a fragmentary consideration of the problems which form the subject-matter of study.

It is necessary to point out that the organisation of subject-matter into "method-wholes" or "long-units" is variable depending as it does on the objectives aimed at by the teacher.

The problem of objective—Every school course has certain purposes in view and if those purposes are to be realized, every lesson must have a definite aim or objective. The determination of this aim is one of the first requirements of lesson-planning and it should always be stated in terms of pupil-attainments, so that attention may be directed to the pupil and away from the teacher. For example 'The aim of the lesson is to teach the difference between the transitive and the intransitive verb' is a statement that places the emphasis on the teacher and what he has to do; it leads one to infer that absorption of certain information by pupils is the aim of the lesson. Re-stated in terms of pupil-attainments it would read as follows: "The aim of the lesson is to develop in the pupil the ability to use correctly the transitive and intransitive verbs." The statement now places the emphasis on the pupil and stresses the ability to be achieved rather than the knowledge to be absorbed. According to the second statement the pupil becomes an active participant in the day's activity while the first one reduces him to a passive recipient of the day's lesson. So care should always be taken to state the aim of a lesson in terms of the achievements by pupils.

The psychology of lesson-planning—In planning a lesson the teacher has to anticipate the classroom situation and apply to it his knowledge of the mental processes. In doing so he has

also to take into account the relation of the laws of learning to the situations that will possibly occur in the class. Dewey points out that there is an inter-relation between deduction and induction n all our thought-processes. In ordinary life situations thinking may start inductively but it is likely to move quickly to an hypothesis, and then back to induction following verification or rejection of the hypothesis through a process of deduction.

Dewey's Five Steps—Dewey selects the following five steps in the thought-process :—

(*i*) A feeling of difficulty
(*ii*) The locating or defining of the difficulty
(*iii*) Suggestion for possible solution
(*iv*) Reasoning on the bearings of the solution
(*v*) Observation and experiment leading to acceptance or rejection of the suggested solution.

The laws of learning give us the basic facts as to how learning is achieved. The law of readiness requires the arousal of certain desires or aims in the pupil with a view to creating his interest in the thing to be learnt. Interest implies an emotional condition of the mind which arouses in the individual willing devotion to toil or hardship for the attainment of the desired goal. Interest in this sense has nothing to do with amusement or entertainment. It seems, further, to be mutually related to attention, for sustained attention depends on the establishment of interest. The process of creating interest of the pupil in a new learning situation is known as *motivation*. So proper motivation is the first problem that confronts a teacher in planning a lesson. The law of use stresses the necessity for repeated exercise so that learning may be consolidated. The truth of this law is self-evident and so no further discussion is necessary. The law of effect states the influence of pleasure and non-pleasure on the consolidation of reactions (which form the basis of learning). The system of reward and punishment is based on this law.

Another important principle involved in the theory of lesson-planning is that, to start with, the new knowledge should be brought into contact with the past experience of the pupil in as many points as possible. New knowledge cannot be acquired except in terms of old. Every teacher is familiar with the adage "from the known to the unknown." Herbart recognised this principle in his doctrine of 'apperceptive masses.' A new item of knowledge becomes a part of the pupil's experience only when it is brought into contact and related to the *apperceptive mass* or past experiences of the pupil, active at the moment. One of the most important tasks of the teacher in planning a lesson is, therefore, to explore the pupil's mind and stir up such past experiences of his as matter, and then to relate the new knowledge to these past experiences. The problem of planning a lesson is thus reduced to how to present new material so that it can be incorporated to the past experiences of the pupil and assimilated by him.

Herbart's Five Formal Steps—Herbart's teaching formula known as the 'Five Formal Steps' is based on the inductive procedure and the principle of apperceptive masses. These Five Formal Steps are as follows :—

I. *Preparation*—This has a twofold function : (*a*) To present clearly to the pupil the purpose of the lesson and (*b*) to stir up the apperceptive mass in the mind of the pupil. If the pupil lacks the experience necessary for the assimilation of the new presentations, it will be necessary to establish a proper apperceptive base before the new lesson can be presented.

Statement of aims—Some are in favour of the inclusion of this step. The aim should, however, be stated in general terms so that the attitude of expectancy may be maintained throughout the lesson.

II. *Presentation*—Here the new materials are brought in contact with the apperceptive mass of the student and the situation is so arranged as to make the pupil react to the materials presented.

The materials are to be arranged into different stages and presented in their proper sequence.

III. *Association or comparison*—At this point the materials presented are analysed and organised into significant relationships that can be used to discover implications. In an object-lesson on the horse, for instance, the description of its various parts and organs (given in course of presentation) is brought into association with its uses with which the pupils are already familiar; here comparison may be made with the parts and organs and their uses of another familiar animal, *e.g.*, the cow.

IV. *Generalisation*—The fourth and the final step in the Herbartian formula seeks to find out the elements of similarity or dissimilarity brought out in the preceding steps and organise the conclusions reached, into a general statement of a principle or rule. As for example, in the above lesson on the horse the conclusions reached in the previous steps may be so organised as to lead to the general statement that "the horse is not a ruminating animal like the cow."

V. *Application*—In the fifth step added by Herbart's followers the conclusions reached are applied to various situations to make clear their significance.

All these different steps of the Herbartian plan can generally be found in a lesson based on the inductive method. The last step, it may be noted, implies deductive reasoning.

Most lessons, however, do not require more than the three following well-defined steps :—

I. Preparation
II. Presentation
III. Application

In the Herbartian theory the teacher rather than the pupil is the principal actor, because it is the teacher who is in charge of preparing the pupils and presenting new knowledge to them; it thus reduces the pupil to the position of a passive recipient. But

even in this method, things may be so arranged that the burden of efforts will be transferred, to a large extent, to the shoulders of the pupil.

A comparison—It will appear that the last two steps suggested by Herbart correspond fairly closely to the two corresponding steps formulated by Dewey. But from the point of view of a teaching formula the first two steps and to some extent the third step of Dewey's suggest a radical departure from the Herbartian plan. In Dewey's outline the child himself must be aware of the difficulty and he must himself seek to locate the difficulty and find the correct solution. Herbart assumes that the apperceptive base is present and it is the teacher's business to explore it and put it into contact with the new problem. Dewey transfers the responsibility of exploring the previous experiences of the pupil, that would help him in attacking the new problem, to the shoulders of the pupil himself. The teacher's responsibility according to Dewey is so to control the classroom situation as to minimise the chances of the pupil's reacting to the new situation in the wrong way.

Steps in a deductive lesson—Both Herbartian plan and Dewey's formula are based on the inductive method. But in many problems arising out of the school course a deductive approach is necessary. There are four steps in the deductive procedure and they are :—

Step I. Statement of the problem in the form of an assertion rather than of an enquiry.

Step II. Search for a tentative hypothesis for the solution of the problem. Analysis of the problem and testing at each step the guesses that such an analysis leads to.

Step III. Formulation of the hypothesis that promises a possible solution.

Step IV. Verification of the hypothesis.

II

The Problem of Method

The problem of method in teaching---The lesson-plan is a guide ; and it must not be followed blindly. But even as a guide to stimulate thought it is of little use unless an appropriate method is used to execute the plan. When the materials for instruction centre around some meaningful activity, the project method may be used and the subject-matter may be organised round a project. A project is a purposeful activity carried to its completion in, as far as possible, a natural setting. There are four steps in the method of project-teaching and they are : Purposing, Planning, Executing and Judging. In this method activity is the important thing. But when the emphasis is on mastery of subject-matter the method of instruction is essentially verbal in character ; such method may take the form of (*i*) recitation, (*ii*) lecture, (*iii*) problem-solving, or (*iv*) supervised study. These are dealt with in some details below :—

The Recitation Method -' Lesson-learning ' was the prominent characteristic of the recitation in olden times, but to-day the recitation is essentially a question-and-answer procedure. The teacher asks questions of broad searching significance so that the pupils' responses may be extended in character and may provoke from them a number of subsidiary questions and comments. Such discussions are fruitful only when the pupils have the background necessary for intelligent participation. But when the preparation of the pupils is insufficient or they lack the apperceptive base, there is little value in continuing the discussion. The teacher may then supplement the deficiencies by a brief lecture. Sometimes the classroom situation is so organised that the pupils themselves take turns in presiding over and conducting the recitation. Such a procedure tends to create in the pupils a corporate feeling as well as the desire to do well individually.

The Lecture Method—The *lecture* is a method of exposition and should be distinguished from telling which is essentially a method of narration. The lecture is the best means to introduce a new subject and as such it is an effective method in the presentation stage of the Herbartian plan. The lecture economises time and may even serve to spur on flagging interest. The lecture should naturally be related to the apperceptive mass of the pupils and developed on the inductive method. It should further seek to keep the class in an expectant attitude; and there should be occasional questions to find if the pupils are following the course of the lecture.

The Problem Method—The " Problem Method " consists of the organisation of the school work in such a way as to present to the mind of the learner a genuine problem that challenges him to a sustained effort to achieve its solution. If a person drops a silver coin in the street he may search for it either by the trial and error method or by charting out his track and examining it in a methodical way. This illustrates the two general approaches to the solution of a problem. In the mental plane the systematic approach admits of two well-known procedures—the inductive procedure which moves from the particular to the general and the deductive procedure which moves from the general to the particular. The Herbartian steps provide a valuable problem-solving technique on the inductive line. A teaching formula on the deductive line has been previously discussed. The latter is useful in the teaching of geometry and geography.

In this method also the teacher has to play a very important rôle. He directs, asks questions, plans an attack in co-operation with his pupils and then supervises their work of executing the plan.

The Supervised Study Method—The " Supervised Study Method " aims at training the pupil in this technique of study while he works in the classroom under the guidance of the teacher. It will be pertinent to summarise here the following rules of effective study :—(1) Distributed practice is more effective than concentrated

practice (particularly in such skill subjects as arithmetic, language study, calligraphy and the like); (2) learning by wholes is more effective than learning by parts (e g., memorising a poem); (3) reactions accompanied by satisfying effects are more quickly learned than those accompained by dissatisfaction or annoyance; (4) the interest of the pupil is closely related to his ability; interest in an activity cannot be secured unless the pupil can successfully take part in that activity (this is particularly noticeable in mathematics and language study); (5) meaningless material is sooner forgotten than meaningful material (unthinking memorisation of theorems in geometry may be cited as examples); (6) reactions acquired in one situation tend to transfer to other situations; everything else being equal, the method of instruction is best which secures a maximum amount of correlation between different subjects (correlation of studies is particularly important in such content subjects as geography, science, history and literature); (7) demonstrations and active participation are often superior to verbal descriptions in learning (this is particularly true in science and nature study); (8) subject-matter learnt in course of interesting activities is longest retained and easily applied (all skill subjects such as arithmetic and language study should be taught through such activities as the shop or the making of a book project in the lower forms).

There are two techniques of supervised study :

(1) The Morrisonian Plan or the Cycle Plan of Teaching—There are two steps in this method : First, the things to be taught are organised into large units called 'comprehensive learning-units'. Secondly, each learning-unit is covered in the following five phases :—

I. *Exploration*—It has three main purposes : (1) economy by the elimination of needless repetitions of work previously studied; (2) the establishment of an apperceptive base by organisation of the past experiences of the pupil; (3) orientation of the teacher for effective preparation of the class for what is to follow.

Oral question, discussions and occassional written tests are used for the realisation of these threefold purposes.

II. *Presentation*—In it the essential elements of the learning-unit are presented by lecture or demonstration.

III. *Assimilation*—At this stage the pupil is directed to search for and master the details of the learning-unit made available to him by the teacher.

IV. *Organisation*—In this phase the pupil attempts at a coherent logical statement of the conclusions reached by him in his search for and study of the details of the learning-unit.

V. *Recitation.*—In the final step the pupil either presents orally to his class the results of his study or submits to a searching examination to give evidence of his mastery of the unit studied. After this there is usually a period of questioning and comment.

No definite length of time is set to complete a learning-unit. The five phases of the teaching cycle may require from a few days to several weeks to cover the unit, depending on its nature.

(2) The Contract Plan—The contract involves the study of a large unit similar to the comprehensive learning unit of Morrison. The quantity and quality of a unit for study is adjusted to the pupils grouped according to their capacities. The rôle of the teacher in the Contract Plan is somewhat similar to that of the teacher in the Morrison Plan. The Contract Plan to some extent resembles the well-known Dalton Plan. The main point of difference is that in the Dalton Plan the pupil enjoys greater freedom in organising his own time-table. In the usual method of teaching, a lesson-unit is generally covered in one day, whereas in either of the above methods of supervised study a lesson-unit may extend to several days. Having established the apperceptive base and outlined a mode of attack the teacher assumes the rôle of a supervisor and

the time is given over to the pupil to study until he is ready for some expression of the results of his study.

Supervised study method requires some adjustment in the school time-table. Usually either the school period is extended to one hour or an extra period is set apart for supervised study at the end of the school day. Classrooms are also provided with such reference books as the pupil may need in his search for and study of the details of the unit he is studying.

III

Teaching Devices

The two most important items in a lesson-plan are the *review* and *assignment*. The review forms a part of the work at the preparatory stage while the assignment comes later.

Review—Review is the revising of the work previously covered so that the things already learnt may be examined in a broader setting and new relationships or associations discovered. The object of the review is not merely to fix in mind the activities or materials learned, but (1) to organize the materials and experiences and to relate them in some meaningful form, as well as (2) to provide an apperceptive base for the new lesson. Critical evaluation, synthesis and interpretation is the essence of the review. The review generally takes the form of discussion. The teacher raises thought-provoking questions and the members of the class try to participate intelligently in the discussion. The teacher may also bring together in a brief lecture the salient points in the previous lesson or some of the students may be asked to frame such a summary and present it before the class. The summary may then be used as a basis for discussion. Another effective method is to set a problem based on the previous day's work. The review in that case will take place in course of the attempts made by the pupils to solve the problem. Suppose the fourth theorem of Euclid has been studied. During the review lesson the teacher might draw several figures on the blackboard in which the congruent triangles

have a common side or a common angle and he may then ask the pupils to name the congreuent triangles; or he might ask the pupils to find the distances between two inaccessible points with the help of the theorem.

Assignment—Assignment is the allotment of a task implying with it acceptance of such a task by the pupil. In most books on school method the assignment is given a central position in the technique of instruction. It is said that the success of a lesson depends to a considerable extent on a proper assignment and that the work of the pupil suffers much more from a hasty or careless assignment than from any other single cause. The assignment, to be effective should (1) clearly and concisely define the task to be done; (2) anticipate difficulties and suggest ways to overcome them; (3) relate the task set to work previously done; (4) arouse the interest of the pupil in the work to be done. The Dalton Plan is based on assignments.

Some useful devices—In this connection we may discuss some of the devices that may be usefully adopted in order to create interest in the pupils. These devices may be used in connection with the methods of instruction discussed above.

(1) *The problem* :—A problem presented by means of questions or by the use of maps or other visual aids is a simple but direct means of stimulating interest. A high school teacher at the end of a lesson on burning and combustion inverted a test tube with wetted iron filings attached to its walls over a beaker of water and asked the pupils to observe what happened in the next few days. The eagerness with which they observed this simple experiment served to fix in their memory the important chemical principle that the experiment illustrated.

(2) *Manual work* :—Children normally respond to tasks that call fourth creative activity in some form or other. The drawing of battle-plans in history, the construction of models in geography or the natural sciences, and the like are devices which not only

foster interest in the subject but provide significant educational values within themselves.

(3) *Dramatisation* :—This is a popular device with classes in literature and history.

(4) *Scrap-books and note-books* :—Children take great interest in collecting pictures and materials in illustration of a geographical or a scientific fact or principle; studies of word-derivation and of grammatical usage may also be so conducted as to exploit the collecting instinct of children.

(5) *Use of suspense* :—It is a very effective device when properly used. The teacher discusses a fragment of a historical fact or a scientific principle or relates a portion of a story from literature and when his pupils are agog with interest he refers them to certain pages in their text-books for the concluding portion of what forms the subject of discussion or narration.

The art of questioning :—The question is the most important tool available to the teacher for stimulating interest and of stirring the pupil to willing efforts. 'No teacher can succeed in his instruction who has not a fair mastery of the art of questioning.' A good teacher leads his pupils by thought-provoking questions to a point from which they can, by their own efforts, reach the desired goal. Such questions must be of sufficient scope to demand that the experience of the pupil be organised anew with reference to the problem under consideration.

It is not possible to discuss here the technique of questioning fully; but it may be pointed out that a good question has the following characteristics :—

(1) It is concisely stated and it means just what it is intended to mean.

(2) It is adapted to the age and ability of the pupils.

(3) It requires an extended response and not merely 'yes' or 'no'.

(4) It does not suggest the answer.

(5) It involves single ideas and reflects a definite purpose.

The following rules regarding the use of questions in the classroom will be found helpful :—

(1) Address questions to the entire class before selecting one to respond.

(2) Distribute questions as far as possible to members of the class evenly.

(3) Allow sufficient time for the formulation of answers.

(4) Organise questions around pivotal ideas.

(5) Do not as a rule repeat questions or answers or suggest answers.

(6) Ask questions in an easy and confident manner.

(7) Occasionally ask questions of the inattentive.

(8) Frame your questions on the basis of the actual classroom situation and avoid formal and insignificant or trivial questions far removed from the situation at hand.

Classified according to functions questions may be divided into the following broad categories :—

(1) *Test questions* :—There are two aspects of questions of this type : First, there are questions which seek to discover to what extent the pupil has mastered the essential facts in the lesson, *e.g.*, What ocean current in the Pacific corresponds to the Gulf Stream ? Secondly, there are questions which seek to test the pupils' understanding of such essensial facts as pertain to the lesson, *e.g.*, What are the properties of an isosceles triangle ?

In either case it is necessary to see that the questions provoke real thinking and also that the pupils have at their command sufficient materials to be able to answer the questions.

(2) *Developmental questions* :—Developmental questions are used in developing a lesson ; they are intended to assist pupils in following the course of the lesson. They serve the purpose of (1) helping the pupil to relate his past experiences to the lesson, (2) and directing his attention to significant elements in the lesson.

In framing developmental questions the teacher should always keep the end in view so that he may direct the attention of the pupil to important items in the lesson and thus train him to think logically and coherently.

(3) *Instructional questions* :—Instructional questions are intended (1) to provide drill, (2) to obtain individual or class attention, (3) to develop appreciation, (4) to discover special interests of each pupil and to provide a direct incentive for study.

Questions asked by pupils also have important bearing on the development and success of a lesson. Students should be encouraged to ask questions. The more the teacher can get pupils to think and ask questions, the more certain he can be that learning is being effected. While encouraging questions by students the teacher should see that such questions are pertinent to the lesson and that they are asked with courtesy. Failure to insist upon this side-tracks a lesson and leads to disciplinary problems. Further, the teacher should never frown upon the student who disagrees with him and challenges the position he has taken up; for that would lead to the unthinking acceptance of his point of view by the pupils. He should, besides, never try to cover his ignorance by bluffing. If he is forced to face a question that he cannot answer, he should frankly say so and promise to deal with it later.

The most fundamental thing to remember in regard to questioning and in fact to all activities in connection with the development of a lesson is that 'education is concerned with a lesson only as a means to an end.' Whether the teacher questions, lectures or demonstrates, his ultimate aim is not so much to impart this or that bit of knowledge to his pupils as to train them up in logical thinking and habits of good work.

Illustration in teaching—To think abstractly without the aid of mental imagery is extremely difficult even for men who have had long years of training in methods of pure reason. The late

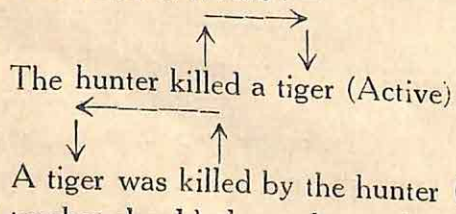
Lord Kelvin once confessed that he could not accept the quantum theory of the propagation of light as he could not make a model of it. It is obvious, therefore, that some aid to understanding is necessary and there are two main forms of aid to the production of mental imagery for the clarification of an abstract thought. One form of illustration depends on such *verbal aids* as anecdotes, stories, descriptions or word pictures and the other on such *visual aids* as models, pictures and diagrams. Non-visual illustrations should be simple and within the range of the experience of the pupil. Excessively vivid pictures that are likely to distract attention from the idea they illustrate defeat their own purpose. The picture of all the houses of a small town piled one upon the other, for instance, in illustration of the depth of the sea is likely to allure the pupil to the contemplation of the picture from the appreciation of depth.

Visual aids—In presenting a visual aid the essentials for which it is presented should be stressed. Often pupils lose the significance of a material aid if they are not previously told about the things to look for. If there are novel aspects to the illustrative material exhibited, these should be incidentally mentioned, so that there is an easy and quick transition of the attention of the pupils from them to the essentials.

Visual aids may take the form of models, pictures or diagrams. The model being three-dimensional is much more useful as an illustrative aid than a picture or a diagram. The relative values of a two-dimensioned and a three-dimensioned illustrative aid can be very effectively demonstrated in the following manner. The well-known diagram of the sun at one of the foci of an ellipse and the earth in the four positions on the circumference corresponding to the four seasons is familiar to every pupil in the upper forms of a high school. Now if a pupil is given a ball of crochet cotton with a knitting needle pierced through it to represent the earth and its axis and he is asked to go round a candle placed on stool to demonstrate the four positions of the earth corresponding to the four seasons, in a majority of the cases he will jealously

hold the ball with the knitting needle turned at an angle of $23\frac{1}{2}^\circ$ from the vertical but always poiting towards the candle. Models have, however, a tendency to become too elaborate. Sometimes they look like and are looked upon as toys and thus they become a source of distraction in the classroom. The orrery supplies a striking example of a model ineffective as an illustrative aid, because it looks more like a toy than anything else.

Pictures supply an effective means of enforcing clear thinking or generating a strong emotion. Descriptions or narrations illustrated with pictures become far more entertaining and far more direct in their appeal. The value of the diagram lies in the fact that we can grasp in one glance a large number of facts and their inter-relations. A diagram should not, however, be allowed to acquire content and approximate a picture; for the loss of its abstractness results in the loss of its illustrative value. If a flat diagram of the heart, for instance, is so embellished that it becomes a picture of the real thing, then the details of its auricles and ventricles, tricuspid and bicuspid valves will be lost in the embellishment. When the things to be illustrated appeal more to our intellect than to our emotion a diagram should certainly be preferable to a picture.

It is surprising how a couple of arrows or a simple geometrical figure may sometimes grip the pupils' imagination and thus become a valuable illustrative aid. The following device will, for instance, be found to be of great help in illustrating the significance of the voice of a verb :—

A good teacher should always be on the look out for suitable pictures and diagrams and maintain a scrap book for the purpose.

Blackboard—Useful as pictures, diagrams, and maps are, sketches actually drawn on the blackboard in the classroom are

superior to them as visual aids. A child's attention easily wanders; a teacher who puts before his class a gaily coloured picture or a well-filled map can never be sure whether the part or aspect of the illustration he is dealing with will be well attended to. If a teacher starts with an outline of a diagram or a map and fills in the necessary details as he proceeds with the lesson, he ensures attention of the class to the relevant parts of the illustration and to them only. Every teacher should, therefore, take some pains to acquire a fair degree of facility in sketching and writing on the blackboard. All writing in maps and sketches should be done in print. In teaching spelling or in drawing the attention of the class to a technical word or expression, the teacher should also write in print. Script-writing is permissible in blackboard summaries, if it is neatly and legibly executed, but writing in print is always preferable because of the greater legibility of such writing. So a teacher ought to practise writing in print. A clever teacher can elevate the blackboard work to the level of an art. In writing on the blackboard the crayon should be held slantingly in the way in which a brush is held. If the crayon is held like a pencil a screeching noise may be produced. The teacher should also familiarise himself with the uses of such blackboard apparatus as the ruler, the set-squares and the protractor.

Two types of blackboard are generally in use and they are the wall and the easel blackboard. For most purposes the easel blackboard is better, for it can be raised or lowered and carried to any part of the room. Fixed wall blackboards are, however, useful in the Art or Geography rooms.

Magic lantern, Epidiascope, Radio—If a school has such equipments for visual instruction as the projector, epidiascope or the magic lantern a special room should be set aside for this purpose. Handling this kind of apparatus requires some training. Then again to give a talk following the pictures projected on the screen is an art that has to be practised and learnt. Visual instruc-

tion to be successful must be related to the curricular work and adapted to individual classes.

The radio as an instrument of education is gradually finding a place in our country and school programmes are now-a-days regularly broadcast. These are intended to supplement and vitalize curricular work. The teacher's part in connection with these talks lies in follow-up work which should naturally take the form of a review.

IV

FURTHER CONSIDERATION OF METHODS

Further discussion of classroom methods—The problem of method has already been discussed but there are certain other teaching devices which deserve some consideration. Some of these devices are particularly suitable in certain types of lessons. These are narration, exposition, heurism and appreciation. Each of these devices may be applied to general methods of classroom instruction.

Narration—The purpose of narration or telling is not to explain something but to present to the mind a series of events or facts that may inform or become the basis for the solution of a problem. Often just a bit of information given to the class at the right moment enables it to hurdle over serious obstacles to learning. Besides, the story has a special fascination for the child and to be able to narrate a story effectively is an accomplishment that no teacher can do without. It should, however, be remembered that school children are too immature for a sustained narration and that to be effective (1) it should be done in well-defined stages, (2) it should, whenever possible, provide a visual stimulus at the end of each stage.

Exposition—The purpose of exposition is to explain something; but nonetheless in course of exposition extensive use of narration and description may be made by the teacher. In exposition the teacher does all the thinking, and he explains the difficulties right away without giving the pupils any opportunity to actively participate in solving those difficulties. Exposi-

tion as a teaching device should, therefore, never be resorted to, until the pupils fail to solve the problem unaided. If however, exposition is used, there should be frequent questions in course of the exposition to test whether the pupils are following the exposition.

Heurism—Heurism is derived from the word 'Heurisco' which means, 'I find out for myself.' Heurism seeks to place the pupil in the position of an original investigator and leave him to discover things for himself. The heuristic method is the method of the research worker; but high school pupils have neither the training nor the rich mental content of a research worker. Unadulterated heurism is, therefore, unworkable. But if the teacher guides the pupil to a certain distance and leaves him only to take the final jump all by himself, heurism becomes a practical device very helpful to the teacher of mathematics and the natural sciences. No pupil who has studied the properties of parallel straight lines and a straight angle can verify unaided the statement that three angles of a triangle are together equal to two right angles But if the teacher by suitable questions leads his pupils to see how the angles can be brought together at one of the angular points of the triangle and added to form a straight angle, most pupils will at once see through the construction and reconstruct the proof.

Appreciation—Appreciation which is defined as aesthetic judgment, really means evaluation. It is closely related to the education of emotions and sentiments. The teacher has ample opportunities in the midst of his classroom activities to train the emotions of his pupils and to help them in the development of those worthwhile interests and aesthetic appreciations so necessary for wholesome and joyous living. The method of developing appreciation is, however, different from that used to teach skills and knowledge. Acquisition of a skill or the absorption of a bit of knowledge is a form of learning which can take place even under threat or compulsion. But appreciation cannot be developed under such circumstances.

It is in fact not possible to lay down hard and fast rules for the development of appreciation. But the teacher may find the following suggestions helpful to developing appreciation :

1. Teach the attitudes you yourself share and practise the ideals you teach.

2. Precepts and slogans repeated often enough have a powerful influence over the thought and social behaviour of pupils; but beware of developing a contrariant attitude.

3. Rituals are a powerful directive force and by setting up school and even class rituals the teacher may provide an effective instrument for the education of emotions.

4. Instruction for appreciation should be mainly incidental.

5. Although appreciation cannot be taught under threat or compulsion, the use of social approval or disapproval may be utilized to secure conformity to the responses desired.

Types of lessons—The teacher should recognise that there are different types of lessons and that there is a different technique of teaching appropriate to each. The differences in lesson-types arise out of the differences in learning-types. Although psychologically there is unity in all learning and much overlapping of one type of learning with another, at least four distinct types of learning are commonly recognised and these are :—

1. Sensory-motor learning.
2. Associative or memory learning.
3. Problem-solving or reflective learning.
4. Appreciation learning.

In conformity to these four types of learning Morrison recognises the following five types of lessons :—

1. *Sensory-motor type*—In the sensory-motor type of lesson, the emphasis is laid on the attainment of skill or the power to do. Craftwork and other forms of manual and physical activities are examples of this type of learning. In

such lessons, therefore, there should be ample scope for appreciation, imitation and repetition.

2. *Language-arts type*—All expressional work falls within the scope of lessons of this type. The most important thing to remember in a lesson of this type is that children learn to do by doing. If the pupils are, for instance, being taught to speak a language, they should have ample opportunities for speaking it. Attention to grammar or other related activities should be incidental, if not omitted entirely. The teacher should strongly bring home the purpose of the lesson both to himself and his pupils and adapt his technique of instruction to the achievement of this purpose.

3. *Appreciation type*—In literature or any other lesson of the appreciation type, it is assumed that there are literary or aesthetic values which are made up of qualities that can be recognised and that can be made to form the bases of standards by which to determine and judge beauty. The teacher's primary task is to draw out these qualities and present them in such graphic form as to arrest attention. But such analysis of literary or aesthetic values should be restricted to those whose interests have not been established. Memorisation, participation and expression are often a very effective means of developing appreciation in poetry, dramatics and art work respectively.

4. *Science type*—Lessons in science, mathematics, grammar, etc., which are particularly based on reflective thinking belong to this type because such subjects deal in generalisation and laws. The problem-solving or the supervised study method is readily usable in lessons of this type. The primary purpose of the teacher in a lesson of this type should be to train his pupils in reflective thinking. While the teaching procedure should make use of the apperceptive masses of the pupils and follow the logical sequence of our thought-process, the subject-matter should be so organised that it may grow out of the preceding lesson and reach forward to the next.

5. *Pure practice type*—Lessons based on repetitions of activities designed to produce motor or mental skills belong to this type. Mastery of the basic arithmetical facts, memorisation of a poem, practice of speed on the typewriter are examples of lessons of this type. The chief point in such lessons is careful practice. To relieve the monotony of repetitive practice game-form exercises should be devised and frequently made use of. Beating the record of one's compatriot or better still one's own record is also a great incentive in lessons of this type.

Thus we see that there are different types of lessons. Then again each type may include different subjects which from their very nature require different treatment. Though both mathematics and grammar may be classed as science type subjects, yet the method of teaching mathematics must necessarily be different from the method of teaching grammar. Even in the same subject there appear differences as in arithmetic, algebra and geometry. A teacher cannot afford to ignore such differences of treatment.

V

Mechanics of Lesson-planning

Form of Lesson-plans—The form of the lesson-plans discussed here may be varied according to the teachers' convenience and the demands made on him by the actual class-room situation. It is good to attend to every minute detail of the form at the beginning so that correct habits of teaching procedure may be established in him and he may later confidently depend on memoriter plans.

The different parts of the lesson-plan are discussed in some details below :—

(1) *Identification*—This section calls for certain items of information such as date, class, subject, number of pupils in the class, normal age of pupils, name of the school and of the

teacher. These items of information are usually entered at the top left hand corner of the page and are arranged thus :—

Lesson...... Lesson No......
Date.................................
School....................
Class........... { No. of pupils........... / Normal age.............
Time................................
Teacher..................

(2) *Scheme of lessons*—The scheme of lessons which is usually appended at the top right hand corner of the page mentions first the *method-unit* or the *method-whole* and then outlines the lesson-units forming the method-whole. The item that forms the day's lesson is then mentioned. In case the very first lesson-unit happens to form the day's lesson, it is necessary to indicate the previous knowledge of the class. The outline of the subject-matter should usually follow in general form and sequence the material of the text-book. This does not mean that the teacher should slavishly follow the subject-matter organisation of even a poorly written text-book and that he is precluded from adding to the material of the book even if it is an improvement on the same.

(3) *Aim*—The aim of the lesson which should immediately follow the outline of the subject-matter should be stated in terms of attainments to be achieved by the pupils.

(4) *Appliances*—It is usual to mention the appliances to be used in course of the lesson just before a detailed outline of the lesson is given. In this connection it is not necessary to include appliances like 'black board' or 'chalk' as it is pre-supposed that these are always available.

(5) *Marginal letters and numerals*—Each phase of the lesson is either given the titles of Herbartian steps or simply designated step I, step II, and so on. In each phase there may be one or more themes which are usually marked by capital letters. Each theme may consist of one or more items and these are designated by numerals.

(6) *The body of the lesson*—As we have already said in drawing up this part, a teacher may follow either the matter-and-method form or the ordinary Herbartian form.

Some general suggestions—In developing the lesson the teacher should concentrate more on the reactions of pupils he proposes to secure than on the factual materials he intends to present. "He should think of the mind of the pupil as a bud; if roughly handled it is injured, if chilled with neglect it does not expand, but if warmed with a kindly encouragement it opens out petal after petal and becomes a perfect blossom." To help this process naturally he should

(1) never tell the pupil what he can find out for himself;

(2) lead from the known to the unknown;

(3) check up on inaccuracies carefully;

(4) speak in a quiet tone and in a language intelligible to the pupils;

(5) present the assignment in such a way that each pupil recognises his task;

(6) set up a high standard of work and refuse to accept any work that falls below that standard;

(7) establish definite rules to conduct class room activities.

Time-budgeting—No teacher can estimate the exact time required to complete the task laid out in his lesson-plan. There are so many uncertain factors in the classroom situation that time budgeting for each major phase of the lesson can only be done approximately. The teacher should, however, keep a record of the time spent on each step of the lesson and if he does that he cannot fail to acquire considerable proficiency in estimating the time required for the average lesson. Another advantage of time budgeting is that it leads to economy of effort on one hand and on the other it prevents the teachers from undertaking an ambitious plan which cannot be executed in the time at his disposal.

VI

Some Difficulties in the Execution of a Lesson

Care of the retarded pupils—A lesson which has been well-planned naturally ends in the assignment of work to be done in preparation for the next lesson. But even a well-planned lesson will prove ineffective if it is too easy or too difficult for a section of the pupils of the class. A teacher, must, therefore, know his pupils thoroughly so that he can adjust the assignments to the needs of groups of pupils of different abilities. Often pupils of average merit who lack the experiences necessary for following a particular lesson are neglected by the teachers on the ground that they do not belong to the group in which they have been placed. Such pupils may be reclaimed, if the teacher makes a little extra effort to establish in them the necessary apperceptive base before he proceeds with the lesson. Any attempt to give group or individual instruction must, however, be accompanied by provision for seat-work for those who are not working with the teacher.

Home-work—It is usual for teachers to set home-work particularly in such skill subjects as mathematics and language study. But skill involves habit-training and as such if pupils require practice in certain phases of these subjects they should be given such practice under the direct supervision of the teacher in the school. Whatever home-work is given it should aim at enriching classwork rather than establishing a skill through practice. There should be some method adopted in a school for regulating the home-work set. In schools where specialist teachers are employed, generally too much home-work is set and the inevitable result is that after sometime nobody, not even the teacher responsible for setting the home-work, seems to care for it. To guard against this danger a time-table for home-work should be drawn up so that pupils may not have to devote more than an hour and a half or two at the

most to home-work and no teacher has to correct more than forty exercise books a day. Such an arrangement will also solve to a great extent the problem of exercise correction.

Correction of exercises—One important point to be remembered in regard to the correction of exercises is that pupils will turn out as bad a piece of work as is accepted. Pupils should be drilled in the mechanics of writing before they are expected to do written work; for it almost takes twice as long to correct written work slovenly done as to grade what has been neatly executed. For affording practice in the mechanics of writing pupils may be asked to transcribe passages from text-books paying special attention to punctuation, capitalization and indentation.

Problem of flagging interest—Young teachers often complain that no matter how well they begin some pupils lose all interest in the lesson after they have attended to it for some time. In most cases they do so either because the lesson is too easy or too difficult for them. In science-type lessons involving close reasoning slow pupils may miss a link in the chain and as a result the rest of the lesson may be unintelligible to them. But sometimes a class may run away because of monotony or mental fatigue; and the surest way to whip up their interest then is to introduce some dramatic element in the lesson. For this purpose every teacher should have a rich repertory of anecdotes or language and number games.

VII

Observation of a Lesson

In training colleges sometimes students are sent in pairs for practice teaching. In such cases students take turn in giving lessons, one observing the lesson while the other actually gives it. To observe a lesson is an education by itself and so it also forms a part of the training programme. This section aims at helping

the teacher in observation work. In observing a lesson the observer should keep in mind the following questions :—

A. Scheme of lessons—

1. Is the long-unit suggestive ? Does it cover the lesson-units ?

2. Is there a logical sequence in the lesson-units ? Does each lesson-unit grow out of the previous one and reach forward to the next ?

B. Aim of the lesson—

1. Is the aim of the lesson stated in terms of pupil-attainments ? Does it emphasize the abilities the teacher proposes to develop in the pupils ?

2. Does the teacher state his aim to the class ? Is it stated in general terms and do the pupils grasp it clearly ?

3. Does the teacher consciously keep the aim before him in developing his lesson ?

C. Preparation—

1. Is the preparation stimulating ? Is it too long or too short ?

2. Does the teacher discover such past experiences of the pupils as form the basis of the new knowledge to the presented ?

3. Does the teacher make the purpose of the lesson clear to the pupils ?

D. Presentation—

1. Is the subject-matter presented accurate and suitable for the class in quantity and quality ?

2. Are the materials presented in logical sequence ?

3. Does the method of presentation stimulate thinking and appreciation ?

4. Does the teacher test pupil-comprehension after each stage of presentation ? Does he carefully correct all pupil-inaccuracies ?

5. Does the teacher make adequate use of the blackboard in presenting the lesson ? Does he make proper use of the illustrative materials employed ?

6. Is the class interested ? If not, why not ? Is the lesson too easy or too difficult ? Are the physical conditions of the room trying ? Is the teaching procedure dull or ineffective ?

7. Does the teacher stimulate the pupils to effort ? Does he secure their participation in developing the lesson ?

E. *Application*—

1. Does the teacher provide sufficient opportunities to the pupils for applying their new knowledge ?

2. Are the situations developed, varied and interesting ?

3. Are there sufficient repetitions of activities to produce mental or motor skill ?

4. Does the teacher train the pupils in habits of good work and study ?

F. *Questioning*—

1. Are the questions clear and concise and do they reflect a definite purpose ?

2. Do the questions require extended response or do they call for 'yes' or 'no' answer ?

3. Are they of the simple recall type or do they require reflective thinking ?

4. Are the questions asked in correct sequence ?

5. Are the questions addressed to the entire class and are they evenly distributed ?

G. *Blackboard*—

1. Is the blackboard properly situated and is it used whenever visualisation of instruction is necessary ?

2. Is the blackboard work neat and legible ?

3. Are the pupils employed while the teacher does blackboard work ?

4. Are the pupils called to the blackboard ? If so, why ?

H. The Teacher—

1. Is the teacher's manner sympathetic and pleasant ? Is his bearing natural and graceful ?

2. Does the teacher speak in a quiet and confident voice or does he shout and betray nervousness or irritation ?

3. Does the teacher establish a procedure definite before starting an activity or discussion ?

4. Does the teacher keep the class under control and does he check inattention or idleness ?

5. Is the teacher active, resourceful and interested in his work ?

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A Tentative Lesson-Plan Blank

Lesson— Lesson No.—

Identification	*Scheme of lessons*
Date..	Method-unit..
School..	Lesson-units
Class.................. { No. of pupils..............	1.
{ Normal age..............	2.
Time..	3. etc.
Teacher..	Here mention the day's lesson or state the previous knowledge of the pupils assumed in case of the first lesson.

Aim—State the aim of the lesson in terms of pupil-attainments.

Appliances—Enumerate such material aids as you have planned to use in course of the lesson.

Preparation—

Matter	*Method*
A:—State such facts as form the background of the unit to be studied.	Mention how you will explore the pupils' mental content and prepare the required background.
B:—Mention past experiences of the pupils relevant to the lesson.unit.	Outline the questions you propose to ask to recall the related ideas.

In case of continuous lessons review the previous lesson and that how far the pupils have assimilated it by a few questions.

If the pupils lack the necessary experience build a proper apperceptive base before proceeding with the lesson.

Announce the purpose of the day's lesson in general terms.

Presentation—

Matter	*Method*
State the new materials to be studied in their logical sequence and divide them into different items	Mention the illustrative materials you propose to use and the types of activities you propose to sponsor to secure the desired reactions of the pupils to the materials presented. At the end of each item conduct an oral test to see if assimilation has been effected.

Association—

Matter	*Method*
Mention the facts arrived at as a result of observation and expriments which you propose to organise into significant relationships.	Outline the questions you propose to ask to bring out points of similarity and dissimilary between the different items of the materials listed.

This step is seldom used except in lessons on science and nature study.

Generalisation—

Matter	*Method*
State the generalisation aimed at.	Show how from an examination of the materials tested you will lead the pupils to the generalisation aimed at

This step is useful in lessons on science-type subjects intended for advanced students.

Application—

Matter	*Method*
Mention the new situations in which you desire the pupils to apply the knowledge just acquired.	Mention the questions or tests requiring the pupils to apply the new knowledge to the situations listed.

When the plan aims at group discussions a third column depicting pupil-activities is usually added. When the practising teacher has gained some experience in the organisation of subject matter, he may, if he so desires, combine that matter and method columns.

—0—

Lesson—ENGLISH POETRY — Lesson No.—

Date......... — Lesson type—Appreciation.

School......... — Topic—Stevenson's 'Bed in Summer.'

Class VI { No. of pupils—40. Normal age—11.

Time—45 minutes

Teacher..... ...

Aim—To help pupils to enjoy Stevenson's 'Bed in Summer.'

I. Preparation.

Matter.	Method.
A. As in method	By way of preparation ask the following questions :— 1. There are places where days are very long in Summer and nights are equally long in Winter. Are these places near the equator or away from it. ? 2. If there is daylight till ten o'clock at night, would you play till it is dark or go to bed by day ? 3. If it is dark till nine o'clock in the morning, would you get-up in darkness or sleep till daylight ?
B. As in method	Tell class that Stevenson lived in Scotland. It being very far North from the equator, days there are very long in Summer and nights are equally long in Winter. Stevenson remembered how he used to feel when he had to go to bed before dark and wrote a story about it. Would they like to hear the story ?

Tell class that Stevenson wrote the story in verse and called it 'Bed in Summer.'

II. Presentation.

Matter.	Method.
A. In Winter I get up at night And dress by yellow candle light ; In Summer quite the other way, I have to go to bed by day. I have to go to bed and see The birds still hopping on the tree, And hear the grown-up people's feet Still going past me in the street. And does it not seem hard to you, When all the sky is clear and blue, And I should like so much to play, To have to go to bed by day ?	Ask class to find out the reasons Stevenson had for not wanting to go to bed by day when you are through reading the poem, Read the poem twice.
B. Different scenes described in the poem	Read the poem again calling attention after each stanza to the scenes described in it.
(*a*) Stanza I The difference between getting up in Winter and going to bed in Summer.	When has Stevenson to get up in Winter ? How does he put on his clothes ? When has he to go to bed in Summer ? Why does he tell you that he has to get up at night in Winter ?
(*b*) Stanza II What Stevenson saw and heard when he went to hed before dark.	When do birds go to bed ? How was he able to see the birds in the trees ? Do you think he ever got out of bed ? What were the birds doing when Stevenson saw them ? Do grown-up people go to bed when children do ? What are the things that tell Stevenson that it is not bed-time ?
(*c*) Stanza III How he felt when he had to go to bed in Summer.	Why does it seem hard to Stevenson to go to bed by day ? Did Stevenson think that there were other children in the street ? What made him think so ?

Matter.	Method.
C. Loud reading by pupils	Ask a few selected pupils to read the poem aloud, paying particular attention to accent, pronunciation, etc., and checking up mistakes when needed. Create audience situation by making pupils face the class.
D. The complete story	Ask class to narrate Stevenson's story about going to bed in Summer. Tell them that you are going to write it on the board so that they can tell the story as Stevenson did. To make pupils recall the different pictures ask the following questions. Put the answers on the B. B. checking up mistakes and embellishing the sentences in co-operation with the pupils: – When does the boy get up in Winter and how does he dress ? When has he to go to bed in Summer ? What does he see and hear when he does so? Why does it seem very hard to the boy to go to bed by day ?

III. Application.

A. As in method	By way of application ask class to fill up the blanks in the following sentences :— (1) Do not go to bed—day and work—night. (2) I read—candle light. (3) The birds were—on the tree. (4) He went—me but I did not know him. (5) It will not rain since the sky is—and— (6) The teacher says we—to —all the questions.
B. Home-work	Memorize the poem.

Lesson—ENGLISH POETRY

Lesson No.—

Date..............

School..............

Class IX { No. of boys—40; Normal age—14 }

Time—45 minutes

Teacher...........

Lesson type—Appreciation and Language Study.

Topic—An extract from 'The Lay of Last Minstrel' by Sir Walter Scott.

Aim—To lead class to understand the full meaning and to appreciate the beauty of the passage and thus be able to reproduce it in their own words.

I. Preparation.

Matter.	Method.
A. Source { Sir Walter Scott; Introduction to 'Lay of Last Minstrel'; Other works of same author }	Refer briefly to the author of the passage—who he was, where he lived, his first poem. Ask what else he wrote and for what he is best known to-day.
B. General remarks in regard to Scott's poetry and the sentiments expressed in the passage.	Tell class that Scott is noted for his many inversions of the natural order of words and ask pupils to look out for such in their reading of the extract. Point out that the extract they are going to read is a beautiful patriotic outburst and ask to what country Scott referred. Do the pupils know of any patriotic poem which refers to Bengal ?

Here introduce the extract to class and briefly refer to the book from which it has been culled.

II. Presentation.

Matter.	Method.
A. "Breathes there the man, with soul so dead, Who never to himself hath said, 'This is my own—my native land!' Whose heart hath ne'er within him burned 5 As home his footsteps he hath turned— From wandering on a foreign strand! If such there breathe, go—mark him well: For him no minstrel raptures swell; High though his titles, proud his name, 10 Boundless his wealth as wish can claim— Despite those titles, power and pelf, The wretch, concentred all in self, Living, shall forfeit fair renown; And, doubly dying, shall go down 15 To the vile dust from whence he sprung, Unwept, unhonoured and unsung!"	Read the poem. Ask class what is the unusual order in the opening line. Why thus placed? Refer to examples of inversion from Gray's elegy and ask class to find out other examples of inversions for emphasis in the passage. What is meant by 'whose heart...... burned?' Is it literally true? What kind of language is it and how can we express it simply? Ask class to look for other examples of metaphors in the passage.
B. Lines 1-6 Inversion—'Breathes...man' As home...turned' Figurative expressions—whose heart burned footsteps turned foreign strand Grammar—hath = has (poetical)	Read the lines and discuss the figurative expressions soul so dead (with so little feeling) whose heart burned (metaphor) footsteps turned } part for whole foreign strand } synecdoche Ask class to express the first six lines in their own words
C. Lines 7-8 Inversion—'For him...Swell' Grammar—mood of 'breathe' part of speech of 'minstrel'	Disscuss the meaning of 'minstrel raptures' and ask what part of speech is 'minstrel.' Can class give other examples of nouns used as adjectives? Draw the attention of class to the case of inversion in 'For him.. swell.'

Matter.	Method.
	Ask the mood of 'breathe.' Is there any other example of subjunctive mood in these lines ? Is such form common. now-a-days ?
	What does 'swell ' literally mean ? what does it imply here ? Have pupils ever heard songs sung in praise of great men ?
D. Lines 9-10 Inversion—'High...name' Omissions—' High though his title ' (be) (As) 'Boundless his wealth as, etc '	Express lines 9 and 10 in simple prose. What words have you to supply ? Draw the attention of class to the case of inversion in 'High though......name' and the alliteration in ' power and pelf.'
E. Lines 11-16 Meaning—despite, pelf, vile dust, concentred, sprung. Figurative expression—' power and pelf ' ' forfeit fair ' ' doubly dying ' Omission—' Living (he) shall forfeit, etc.'	Discuss the meaning of ' despite ' (notwithstanding), pelf (riches). vile dust (the earth), sprung (sprang—past participle for past-tense), concentred (concentrated). Draw attention of class to the alliteration in ' forfeit fair ' and 'doubly dying.' Point out the significance of the latter expression.
	What is the omission in line 13 ? How do we express ' unwept ' and ' unsung ' in simpler form ?
	Ask class to paraphrase the last six lines seeking only the best way to express the thoughts in them in natural prose.

III. Application

Matter.	Method.
As in method	By way of application ask class to read the entire passage without interruptions as to grammar or figures of speech and paraphrase it seeking as well as they can to express the thoughts of Scott simply but truly in their own words.
	Go round the class solving individual difficulties.

Lesson—ENGLISH PROSE

Lesson No.—

Date.........

Lesson type—Reading and Languge Study.

School.........

Class IV { No. of pupils—28, Normal age—10 }

Topic—' The Hare and the Tortoise ' (a fable).

Time—40 minutes

Knowledge assumed—The pupil can speak and read easy sentences.

Teacher......

Aim—To enable the pupils to render the fable intelligently and to assimilate new words.

T*eaching Aids*—The picture in the text.

I. Preparation

Matter.	Mothod.
A little talk about the picture :— 1. What do you see in the picture ? [Hare, Tortoise... not expected.] 2. What is the hare doing ? [Sleeping.] 3. What is the tortoise doing ? [Crawling.] 4. Does a hare (crawl, run, or bound) ? [Bound.] 5. If the hare and the tortoise were to run a race, which would win ?	Catechetical method will be employed, and the conversation between the teacher and the taught is to take a natural form. Complete sentences may, at times, be insisted upon. The aim is to prepare the pupils for the lesson and to avail of the "Law of Readiness."

II. Presentation

A. Declare the aim and the synopsis.	Curiosity is to be tapped to arrest attention. (Interest will, no doubt, be maintained.) 'Let us see how a tortoise could beat a hare in a race.'

Matter.	Method,
Synopsis : Aesop was born very long ago. He wrote many short stories about animals—fables. About 231 fables have been published. This book is called 'Aesop's Fables.' 'The Hare and the Tortoise' is a short story taken from Aesop's Fables. The story goes : A hare and a tortoise, once, ran a race. The hare was proud of her swift-footed nature. She slept on the way, and she overslept herself. The tortoise moved on slowly and steadily and beat the hare.	
B. Difficulties anticipated : Hear, Hair, Hare. Tortoise (pr.—tus) Plod. Plodding = walking heavily. Resolved = decided. Nap = short sleep. Over, overtake, oversleep = sleep too long. (catch up)	The words will be presented on the blackboard, and introduced as new friends to the scholars. Attention will be drawn to the spellings of 'tortoise' and to 2 d's in 'plodding.' Students will be asked to look at the words and to picture them with eyes shut. Necessary drilling will be given.
C. Recapitulation	The aim is to test comprehension.
D. Pattern reading. Paragraphs 1-3 *The Hare and The Tortoise.* A *hare* once met a *tortoise* | and was *rude* to him. She not only *boasted* of her *own speed* in running, but made fun of | the *slow and clumsy* way | in which the tortoise moved. (and so on.)	The paragraph will be read slowly making additional pauses denoted by vertical lines and the underlined words will be emphasized.
E. Difficulties not anticipated.	These difficulties (if any) will be invited and then the comprehension will be questioned.
F. Individual reading. Points to be attended to : 1. Slowness—Pausing and phrasing. 2. Intonation and pronunciation 3. Intelligent rendering. 4. Posture	Mistakes, if any, will be got corrected and let the defaulter repeat the correct form. The pupils will be asked to sit and stand upright. While sitting — position of the seat and the desk will be insisted upon. 10″ distance will be insisted upon (between the eyes and book).

Matter.	Method.
G. Paragraph 4.	Same Procedure.
(*a*) Silent reading by the class.	Vocalization will be deprecated.
(*b*) Retell the story in your own words.	A selected scholar will give a concatenated account, his fellows being allowed to correct and supplement his answers. It may be necessary to interpolate a word here or a question there to keep the pupil on the right track.

III. Application

Matter.	Method.
1. If the hare and the tortoise had been equally wise which would have won the race ?	The questions will be put to the class and then evenly distributed.
2. The hare was too (swift, confident, lazy). [Choose the right word.]	
3. What does the story teach us ?	
4. Usages : Overtake, make fun of, over (combinations with eat, ect).	
5. Grammar : what does '?' denote?	The Symbol '?' will be presented on the B.B.
6. Reference for further reading from Aesop's Fables.	

Lesson—ENGLISH GRAMMAR Lesson No.—

Date...... Scheme of Lessons

School......

Method-unit—Tense-forms of verbs showing the time and state of a completed action.

Class VI { No. of pupils—40. Normal age—12.

Time—45 minutes

Teacher......

Lesson-units

*1. Present Perfect Tense.
2. Past Perfect Tense.
3. Future Perfect Tense.

Previous knowledge—Conjugation of verbs, the indefinite and the continuous tenses.

* Item No. 1 forms the day's lesson.

Aim—To exercise judgment of the class and interest them in the form and uses of the present perfect tense.

Aids—A picture showing (1) a man in the act of writing a letter, and (2) a man who has just finished writing a letter.

I. Preparation

Matter	Method
A. The principal parts of a verb that are used in making the tenses.	Introduce lesson by asking class to give the past, past-participle and present participle forms of the following verbs:—see, sit, go, teach, take, draw, write, read, beat, be, etc.
B. Refer to the fact that the tense form of a verb shows (1) the time of the action implied. (2) the state of the action at the time (completed, not completed, likely to be completed, not likely to be completed).	Present the following sentences to class and ask what the form of the verb in each of them says in respect of (1) the time of the action implied, and (2) the state of the action at the time :— (1) I went there. (2) I shall go there. (3) If he goes to London, he will join the air force. (4) If he flew to the moon, he would be suffocated.

Here announce the day's lesson and ask class to note carefully the (1) time, and (2) state of the action implied by a verb in the present perfect tense.

II. Presentation

Matter	Method
A. The (1) time and (2) state of the action implied by a verb in the present perfect tense.	Exhibit the picture referred to and ask class as to the (1) time and (2) state of the action depicted in the picture. Lead pupils to infer that while present time is indicated in both cases, the state of the action is not the same in both. In the first picture the action is unfinished and is still going on, while in the second case the action is completed and is not going on.
	Help pupils to suggest titles of each of the two pictures and in co-operation with them bring out the following analysis :—
	(1) time of action, (2) state of action.
	(1) A man is (present) writing (unfinished) a letter.
	(2) A man has (present) written (completed) a letter.
	Tell pupils that in the second case the verb is said to be in 'Present Perfect Tense.'
	B. B. Summary
	The Present Perfect Tense is used when
	(1) the action implied by the verb relates to present time ;
	(2) the action is completed and is not going on.
B. Refer to the two parts of a verb in the present perfect tense :—	Lead pupils to see that as a verb in the present perfect tense implies two things, it has two parts :
(1) the auxiliary verb 'to have' ; (2) the principal verb in the past participle form.	(1) In the first part we use the auxiliary verb 'to have' to show the time.
	(2) In the second part we use the principal verb in its past participle form to show that the action is completed.

Matter	Method
	Test pupils by asking them to combine the three columns in as many different ways as they can, each time using the verb in the middle column in its correct tense form as the connecting link :—

I		now
He	to draw a new picture	already
They		yesterday

Matter	Method
C. Draw the attention of class to the fact that adverbs or adverbial phrases denoting time often determine the tense form of the verb to be used.	Question class as to the time of the action implied by a verb in the present perfect tense and if an adverb like 'yesterday' or an adverbial phrase like 'six years ago' can be used with it. Let class find out which of the following adverbs and adverbial phrases have reference to present time and which of them refer to past time only :—

For six years	Since last Monday
Six years ago	Last Monday
many years ago	Yesterday
For many years	Already
Just	Just now

Matter	Method
D. Analyse the functional uses of a verb in the present perfect tense and draw attention of class to such analysis.	Present the following sentence to class :—

(1) I have washed my hands.

And ask

What is the effect of the action implied by the verb ?

Does the effect still persist ?

Present two more sentences

(2) The boy has been ill since Monday last.

He has lived here for six years.

And ask

When was the boy taken ill ?
Is the boy still ill ?

Matter | Method

When did he commence living here ?

Where is he living now ?

Draw the attention of class to the difference in the uses of ' for ' and 'since.'

B. B. Summary

A verb is used in the Present Perfect Tense to explain

(1) that the position now is due to an action which was finished a short while ago;

(2) that what is happening now was begun a little while ago.

III. Application

A. Form and uses of a verb in the present perfect tense : set problem to class as in method.

Draw the following sketch on B. B. and ask class to combine the three columns and form as many sentences as they can :—

	has taught him English	since last October
Our teacher		last October
		in October
	taught him English	for several months
		at that time.

B. Distinction in the uses of 'since' and ' for ' : give directions to class as in method.

Write the following phrases on B. B. and ask pupils to arrange them in two lists

(*a*) those which begin with 'since' and

(*b*) those which begin with ' for '—

three years	last Monday
the beginning of this month	first April
a fortnight	several days.

Matter.	Method.
C. Home-task : give directions to class as in method.	Put down the following sentences on B. B. and ask class to rewrite them using the verb enclosed within brackets in each in its correct tense form :— 1. The teacher (to explain) that word already. 2. The teacher (to explain) that word last week. 3. I (to open) my eyes at that moment. 4. You (not to speak) since I arrived. 5. It is sunset now, and I (to take) no food this morning. 6. It is not yet mid-day and I (to take) no food this morning.

Lesson—ENGLISH TRANSLATION

Lesson No.—

Date...

School...

Class VI { No. of pupils—40. Normal age—12.

Time—45 minutes

Teacher...

Scheme of Lessons

Method-unit—Simple Sentences with defective and anomalous verbs.

Lesson-units

1. The verb 'To be'.
2. The verb 'To have'.
3. 'Can' and 'may'.

*4. Translation of short passages involving the use of such verbs.

* Item No. 4 forms the day's lesson (first lesson)

Aim—To lead the class to note the distinction between Bengali and English modes of expression specially in respect of verbs and to translate the following passage into good English.

Aids—Game-Cards

I. Preparation.

Matter | Method

A. Refer to the uses of the verbs 'To be' and 'To have.'

Begin lesson by asking class to render into English Sentences of the following type orally :—

1. তিনি আমাদের শিক্ষক।
2. ইহা একটি সোনার আংটি।
3. তাহারা বাগানে আছে।
4. তাহাদের একটা বাগান আছে।

B. Bring out the distinction between 'can' and 'may' by variously using the Bengali verb 'পারা' in the sense of সামর্থ্য, সম্ভাবনা and অনুমতি।

Ask pupils to translate the following sentence into English stating in each case the significance of the verb 'পারা' :—

1. পাখীরা উড়িতে পারে।
2. আমি কি বাহিরে যাইতে পারি ?
3. কাল বৃষ্টি হইতে পারে।
4. বালকটি পরীক্ষায় পাস হইতে পারে।
5. তুমি কি সাঁতার দিতে পার ?

Announce the day's lesson and present the passage to the class.

II. Presentation.

A. Class will read the following passage through to get a general idea of what it conveys :—

আমি একটি পাখী। আমার **দুইখানি পাখা** আছে, আমি উড়িতে পারি। বালক-বালিকাগণ! তোমরা উড়িতে পার না, পার কি? আমি **গাছের উপরের ডালে বাসা করি**। আমার বাসায় চারিটি **নীল রঙের ডিম** আছে। তোমরা ডিমগুলি দেখিতে পার, কিন্তু সেগুলিতে **হাত দিও না**। চারিটি ডিম হইতে চারিটি **ছোট ছানা বাহির হইবে**। **কয়েকদিন পরে** আসিলে তোমরা ছানাগুলি দেখিতে পারিবে।

Take each of the expressions underlined and deal with them somewhat in the following manner:—

1. **দুইখানি পাখা** :—How can দুইখানি be otherwise expressed in Bengali? Let class supply other examples of nouns qualified by এক জোড়া and then render each of them into English.

2. **গাছের উপরের ডালে** :—Give similar examples to class such as এই বাড়ীর উপরের দুইটি ঘর ; আমাদের বিদ্যালয়ের উপরের তিনটি শ্রেণী and help pupils to render them into English.

Method

Using the adjective top in each case, point out the order of numeral and qualitative adjectives, if necessary.

3. বাসা করি :—How is পাখীর বাসা rendered into English? And সিংহের বাসা, বন্যপশুর বাসা বা মানুষের বাসা? Elicit other examples of করা used in the sense of building.

4. নীল রঙের ডিম :—Elicit from class other epithets denoting colours followed by appropriate nouns and lead pupils to find their English equivalents.

5. হাত দিও না :—Drill pupils in the negative imperative forms of verbs and discuss similar verbal phrases like কাণ দেওয়া and মন দেওয়া।

6. ছোট ছানা :—Lead the class to see the distinction between ছোট in ছোট ছানা, ছোট ছেলে and ছোট in ছোট গাছ, ছোট বাড়ী।

7. বাহির হইবে :—Lead pupils to use the English equivalent of the verbal phrase in such sentences as কাল পরীক্ষার ফল বাহির হইবে, বহিখানি এক সপ্তাহ পরে বাহির হইবে।

8. কয়েকদিন পরে :—Ask class to translate কয়েকদিন পরে and কয়েক-দিন পূর্ব্বে বা আগে and drill pupils in the use of correct tense forms of verbs with the adverbs *later* and *ago*.

Matter	Method
B. Game-card Class .... Roll No. ...... Put correct numbers against the English words and expressions:— 1. দুইখানি পাখা ( ) on the top branch 2. কয়েকদিন পরে ( ) blue eggs 3. উপরের ডালে ( ) a pair of wings 4. বাসা করি ( ) will come out 5. নীলরঙের ডিম ( ) a few days later 6. হাত দেওয়া ( ) young birds 7. ছোট ছানা ( ) build my nest 8. বাহির হইবে ( ) touch	If further drill in the English equivalents of the expressions discussed is necessary, introduce play-way with the help of the matching test employed in the game-card.
C. The translation of the passages should run as follows :— I am a bird. I have a pair of wings ; I can fly, can you? I build my nest on the top branch of a tree. There are four blue eggs in my nest. You may see the eggs but do not touch them. Four young birds will come out from the four eggs. If you come a few days later, you may see the young birds.	Ask pupils to translate the passage orally sentence by sentence and as they do so put each of the sentences on the B. B. and correct and polish it, if necessary, in co operation with them, until it reads like the model appended.
D. The ability of class to recognise and use the pivotal words and expressions employed in translating the passage will now be tested.	Allow pupils some time to go through the English rendering of the passage. Then rub out the pivotal words and expressions employed in translating the passage and ask class to fill in the blanks. This done, turn the board round.

III. Application.

Matter	Method
A. Supervised seat-work : Give directions to class as in method.	Ask pupils to translate the passage keeping class to the form and expressions presented to them. Go round and supervise class at work offering individual help where necessary. Collect papers for correction and marking.
B. Home-task ; give directions to class as in method.	Ask pupils to transcribe the following sentences from the B. B. and fill in the blanks with suitable verbs :— 1. The rich man—a garden 2. The rich man—in the garden 3. There—a nest on the top branch of the tree. 4. There—four eggs in the nest. 5. Birds—fly 6. —I go home now? 7. —a tiger kill an elephant. 8. The teacher—ask you this question.

Lesson. BENGALI POETRY

Lesson No....

Date.........

Lesson Type—Appreciation

School.........

Topic—বাংলা কবিতা—

মাতৃভক্তি (কালিদাস রায়)

Class IV { No. of pupils—30, Normal age—9 }

Time......40 minutes

Teacher.........

মাতৃভক্তি

নগর ও গ্রাম লুঠিয়া পাপীরা—
রাজার তলবে জুটিল যবে,
করে সুলতান দণ্ডবিধান,
আনতমুণ্ডে দাঁড়ায়ে সবে।
মৃত্যু, নেত্রদহন, বেত্র,
চিরকারাবাস ইত্যাকারে,
শাস্তিপত্রী তাহাদের মাঝে
বিলি করা হোল নির্ব্বিচারে।
জীবনদণ্ড লভিল যে জন,
দাঁড়ায়ে কহিল জুড়িয়া পাণি,
"মরিতে ডরিনা ; শুন নিবেদন
একটী সকলে—চরম বাণী।
অন্ধ মায়ের এক ছেলে আমি,
মার ভার যদি লও গো কেহ,
এই আশ্বাস-প্রবোধ পাইলে
পারিব হেলায় ত্যজিতে দেহ।"

আসামী-দলের উঠি একজন
তাহার পত্রী কাড়িয়া নিয়া,
কহিল দাঁড়ায়ে, আপন পত্রী
তাহার হস্তে গুঁজিয়া দিয়া,
"আমরা মায়ের পাঁচ সন্তান
তা'র মাঝে আমি অধম হীন,
আমি কুপুত্র, মায়ের মহিমা
বুঝিনি জীবনে একটী দিন।
তোমার মতন মাতৃভক্ত
মাতার সেবায় বাঁচিয়া রোক্।
কশার দণ্ড লও তুমি ভাই,
জীবন-দণ্ড আমার হোক্।"

—কালিদাস রায়

উদ্দেশ্য—

সম্পূর্ণ আবৃত্তি-ভঙ্গীকে আশ্রয় ক'রে, প্রধানতঃ ধ্বনি ও ছন্দের সাহায্যে, কবিতাটীর বিশিষ্ট নাটকীয় রসকে ছাত্রদের চিত্তে সঞ্চারিত ক'রে দিতে হবে। দস্যুদের মধ্যেও মহত্বের বিকাশ দেখা যায়, এই তত্বটীর প্রতি পাঠোদ্যমকে ইঙ্গিতে পরিচালিত করা প্রয়োজন।

প্রথম পর্য্যায় -

"ডাকাতের গল্প নিশ্চয় তোমাদের ভালো লাগে। আজ তোমাদের একটা ডাকাতের গল্প বল্‌ব"—এই ভাবে পাঠের সূচনা।

"আচ্ছা, ডাকাতদের মধ্যে কি ভালো লোক থাকতে পারে?" [ছাত্রদের উত্তর] "বেশ, আজকে তোমরা ডাকাতদের যে গল্প শুনবে তাদের মধ্যে কোনো ভালো লোক ছিল কি না তোমরা আমায় ভেবে বলবে।"—এইরূপে পাঠের আয়োজন।

এইখানে ছাত্রদের প্রশ্ন ক'রে 'শাস্তিপত্রী' কথাটীর তাৎপর্য্য পরিষ্কার ক'রে নেওয়া হবে। তারপর মূল পাঠের অবতারণা।

দ্বিতীয় পর্য্যায়—

১। শিক্ষকের প্রাথমিক পাঠ। প্রধানতঃ আবৃত্তির সাহায্যে কবিতাটীর অর্থ যথাসম্ভব পরিস্ফুট ক'রে তোলা হবে।

২। শিক্ষকের দ্বিতীয়বার পাঠের প্রসঙ্গে স্বল্প ব্যাখ্যা।

দুইটী ছাত্রকে আহ্বান ক'রে 'শাস্তিপত্রী'র ব্যাপারটী এবং দুই দস্যুর কথোপকথনকে নাট্যাকার দেওয়া হবে।

নিম্নলিখিত শব্দগুলি অর্থসমেত ব্ল্যাকবোর্ডে লিখে দেওয়া হবে। ছাত্রেরা সেগুলির সাহায্যে কবিতাটীর অর্থ উপলব্ধি করবার চেষ্টা করবে মাত্র ; সুতরাং সেগুলিকে তাদের লিখে নেবার প্রয়োজন নেই :—

তলবে—ডাকে। দণ্ডবিধান—শাস্তিদান। নির্ব্বিচারে—বিনা বিচারে। চরম-বাণী—শেষ কথা। আশ্বাস-প্রবোধ—ভরসা। কশা—বেত।

৩। ছাত্রেরা পৃথক্‌ভাবে কবিতাটী পড়বে। তাদের পাঠে আবৃত্তি-ভঙ্গীকে পরিস্ফুট করতে সাহায্য করা হবে।

৪। নিম্নলিখিত প্রশ্নগুলির দ্বারা কবিতাটীর আখ্যানভাগের পুনরাবৃত্তি করা হবে :—

এই কবিতাটীতে ক'জন ডাকাতের কথা তোমরা পড়লে ? তাদের কা'কে কী শাস্তি দেওয়া হয়েছিল ? যা'র মৃত্যুদণ্ড হয়েছিল সে কী বল্‌লো ? যা'র কশাদণ্ড হয়েছিল সে কী বল্‌লো ?

তৃতীয় পর্য্যায়—

কবিতাটীর মর্ম্ম এবং রস ছাত্রেরা কতদূর গ্রহণ করেছে. নিম্নলিখিত প্রশ্নগুলির সাহায্যে তা পরীক্ষা করা হবে :—

(১) এখন বলো, ডাকাতদের মধ্যে ভালো লোক আছে কি না। যাদের কথা শুনলে তাদের মধ্যে কে ভালো ? কেন তা'কে ভালো বলছ ?

(২) ঐ দু'জন ডাকাতের মধ্যে কা'কে তোমার বেশী ভালো লাগে ?

(৩) ডাকাতের এই গল্পটা ছোটো ক'রে বলতো।

(৪) এই কবিতাটীর একটা ভালো নাম কী দেওয়া যেতে পারে ?

Lesson—BENGALI PROSE

Lesson No....

Date—

Lesson Type—Reading and Comprehension.

School—

Topic—বাংলা গদ্য—
বাবরের মহানুভবতা

Class VI. { No. of Pupils—
Normal Age—

Time—40 minutes

Teacher—

উদ্দেশ্য—

ভালপঠন, বিষয়-বোধ ও নিজ ভাষায় ভাব প্রকাশে ছাত্রদিগকে সহায়তা করা।

উপকরণ—

মুসলমান সম্রাট মহানুভব বাবরের ছবি।

আয়োজন—

নিম্নানুরূপ প্রশ্নের সাহায্যে ছেলেদের বিষয়বস্তুতে আগ্রহ জাগাইয়া তোলা হইবে—

তোমাদের মধ্যে অনেকেই চিড়িয়াখানা দেখিয়াছ—

সেখানে বড় বড় কি কি জন্তু দেখিয়াছ?

বড় একটা হাতী যদি তাড়া করিয়া আসে তাহা হইলে তোমরা কি কর?

বড় রাস্তার ভীড়ের মধ্যে যদি একটা পাগলা হাতী ছুটিয়া আসিতে থাকে তাহা হইলে লোকগুলি কি করিবে?

ছুটিবার সময় লোকেরা কি করে?

একসঙ্গে চীৎকার করিয়া ছুটিলে যে শব্দ হয় তাহাকে কি বলা হয়?

এইরূপ একটা হাতীর সম্মুখে যদি একটি ছেলে পড়ে, তবে তাহার কি অবস্থা হয়?

আচ্ছা, যদি কোন লোক ঠিক সেই সময় নিজের জীবনের মায়া না করিয়া ছেলেটিকে বাঁচায়—তবে তাঁহাকে কি বলিবে?

এইবার ছেলেদের বলা হইবে যে এইরূপ একটি লোকের গল্প আজ তাহারা পড়িবে।

উপস্থাপন—

(ক) অদ্যকার পাঠ ছেলেদের ভাল করিয়া পড়িয়া শুনান হইবে ও তাহাদের কয়েকজনকে উহা পড়িতে বলা হইবে ও আবশ্যকমত তাহাদের ভুল সংশোধন করিয়া দেওয়া

হইবে। পরে, বালকদিগের সহযোগিতায় কঠিন কঠিন শব্দের প্রতিশব্দ বাহির করিয়া বোর্ডে লিখিয়া দেওয়া হইবে ও উহা তাহাদের নিজ নিজ খাতায় তুলিয়া লইতে বলা হইবে।

সম্ভাবিত কঠিন শব্দ—

কোলাহল, বিপদাপন্ন, মুখশ্রী. চূর্ণ-বিচূর্ণ. মত্ত-মাতঙ্গ. মহানুভব, সন্ত্রস্ত, উষ্ণীষ, বৃংহিত।

(খ) পরে অদ্যকার পাঠ ছেলেদের মনে মনে পড়িতে বলা হইবে ও নিম্নানুরূপ প্রশ্নের সাহায্যে বিষয়বস্তুটিকে ছেলেদের যাহাতে সম্যক্ ধারণা হয় তাহার চেষ্টা করা হইবে।

রাজপথে কি শুনা যাইতেছিল ?

লোকজন কি করিতেছিল ?

ঐ লোকজনের পিছনে কি দেখা গেল ?

হাতীটি কি করিতেছিল ?

তাহার শব্দে পথিকেরা কি করিল ?

তাহার পায়ের তলায় কে প্রায় পড়িতেছিল ?

কিন্তু সে কি করিল ?

লোকজনেরা তখন কি করিতে আরম্ভ করিল ?

ঠিক সেই সময় রাস্তায় আর কোন্ জিনিষ দেখা গেল ?

সহসা সকলে চীৎকার করিয়া কি বলিল ?

শিশুটির কি হইল ?

হাতীটা কি করিল ?

যিনি ছেলেটিকে বাঁচাইয়াছিলেন, তাঁহার পোষাক কিরূপ ছিল ?

তাঁহার মুখশ্রী কিরূপ ?

তিনি পরের জন্য কি করিয়াছিলেন ?

এইরূপ লোক কয়জন হয় ? —ইনি কে ?

এইবার ছাত্রদের মুসলমান সম্রাট মহানুভব বাবরের ছবি দেখান হইবে।

অভিযোজন—

নিম্নানুরূপ প্রশ্ন জিজ্ঞাসা করিয়া দেখিতে হইবে যে ছেলেদের বিষয়বস্তুটিতে সম্যক্ ধারণা হইয়াছে কি না—

বাবর কে ছিলেন ?

তিনি কিরূপ লোক ছিলেন ?

তাঁহার মহানুভবতা সম্বন্ধে কি জান ?

পাঠ্যবস্তু

বাবরের মহানুভবতা

ও কি! এত কোলাহল কেন? রাজপথে সহসা এরূপ কলরব উঠিল কেন? কেহ কাহারও দিকে চাহিয়াও দেখিতেছে না। যে যেদিকে পারিতেছে, প্রাণভয়ে ছুটিতেছে। সেই জনতার পশ্চাতে দেখা গেল, এক প্রকাণ্ড মত্ত-মাতঙ্গ হেলিয়া দুলিয়া সেই দিকে আসিতেছে। সম্মুখে যাহা কিছু দেখিতেছে, ভাঙ্গিয়া চূর্ণ-বিচূর্ণ করিতেছে। তাহার বৃংহিত শব্দে ভীত পথিক আরও আকুল হইয়া দ্রুতবেগে পলায়ন করিতেছে।

ঐ বুঝি হস্তীর পদতলে পড়িয়া বৃদ্ধা মরিল! না-না, সে পলাইয়াছে। কে কাহার ঘাড়ে পড়ে কে কাহাকে ঠেলিয়া যায়! ঐ-ঐ কাহার উষ্ণীষ রাজপথে গড়াগড়ি যাইতেছে!

সহসা সকলে চীৎকার করিয়া উঠিল, —"দুধের ছেলেটি বুঝি যায়!"

—"ওরে পলাইয়া আয়, ওরে পলাইয়া আয়।"

একটি সুন্দর শিশু সেই হস্তীর সম্মুখে পড়িয়াছে আর বেশী দূর নয়, হস্তী আসিয়া পড়িল।

সহসা রাজপথের অপর দিক হইতে একজন বলবান্ পুরুষ ছুটিয়া আসিয়া তাড়াতাড়ি শিশুকে লইয়া রাজপথের আর একধারে ছুটিয়া গেল। হস্তী হুঙ্কার করিতে করিতে সেই আকুল জনতা সন্ত্রস্ত করিয়া চলিয়া গেল।

এই মহাপুরুষ কে? পরিচ্ছদ সামান্য হউক, কিন্তু মুখশ্রী গৌরবপূর্ণ! পরের জন্য নিজের প্রাণ বিপদাপন্ন করিতে পারে, এমন লোক জগতে বিরল। কে ইনি?

ইনি আমাদের পূর্ব্বকালের মুসলমান সম্রাট মহানুভব বাবর! (পরিবর্ত্তিত)

—সুরেশচন্দ্র সমাজপতি

Lesson—BENGALI COMPOSITION Lesson No....

Date— Lesson Type—Composition

School— Topic—ঘড়ি ও ঘণ্টার কথোপকথন

Class V. {No of Boys—20
Normal Age—10}

Time—45 minutes

Teacher—

উদ্দেশ্য (Aim)—বাংলা সাহিত্য ও রচনায় উৎসাহ জন্মানো, কল্পনাশক্তি বাড়ানো।

ভূমিকা (Preparation)

বিষয়বস্তু (Matter)

প্রণালীর অনুরূপ

প্রণালী (Method)

শিক্ষক ছাত্রদের বলিবেন, "মনে কর এক যাদুকর আসিয়া তাহার মায়াদণ্ড ঘুরাইয়া দিল আর আমরা সকলে ঘুমাইয়া পড়িলাম। তখন যাহাদের আমরা সাধারণতঃ প্রাণহীন বলিয়া মনে করি এবং যাহাদের সম্বন্ধে আমাদের ধারণা যে তাহারা কথাবার্তা বলে না, তাহাদের কথাও আমরা শুনিতে পাইতেছি। দেখিতেছি ইস্কুলের বড় ঘড়ি ও ঘণ্টা যেন কি কথাবার্তা বলিতেছে; তাহাদের কথাবার্তা কান পাতিয়া শোনা যাক।

উপস্থাপন (Presentation)

শিক্ষক বোর্ডে লিখিবেন, "ঘড়ি ও ঘণ্টার কথোপকথন।"

শিক্ষক জিজ্ঞাসা করিবেন, "তাহারা কি বিষয়ে কথা বলিতেছে মনে হয়?"

[প্রত্যাশিত উত্তর, নিজেদের বিষয়।]

শিক্ষক জিজ্ঞাসা করিবেন, "সকাল হইতে সারাদিন-রাত্রি তাহাদের কি ভাবে কাটে?"

ঘড়ি ও ঘণ্টা নিজেদের সারাদিনের কাজ-কর্ম্মের বিষয় গল্প করিবে।

শিক্ষক এইসময়ে ছাত্রদের দুইভাগে ভাগ করিবেন, একভাগ ঘড়ির কথা ও অন্যভাগ ঘণ্টার কথা বলিবে। ...তখন তিনি ছাত্রগণকে কথা বলিতে উৎসাহ দিবেন।

ঘড়ি—নমস্কার, ঘণ্টা ভায়া, কেমন আছ?

ঘণ্টা—এই যে ঘড়ি মশাই, নমস্কার, তোমার খবর কি?

ঘড়ি—খবর আর কি ভাই, দশটা তো বাজে, এখন সবায়ের ইস্কুলে আসবার সময় হল।

ঘণ্টা—ঐ যে দারোয়ান আমায় বাজাতে আসছে।

এইখানে প্রথম দুইজনের বদলে শিক্ষক আর দুইজনকে কথা বলিতে বলিবেন।

বিষয়বস্তু (Matter)	প্রণালী
ঘড়ি—এখনি সকলে বই শ্লেট নিয়ে পড়তে আসবে।	নিজেকে ঘড়ি মনে করিয়া ছাত্র এই দৃশ্যটি আর একটু বিস্তারিতভাবে বর্ণনা করিবে।
ঘণ্টা—ঐ দেখ, সবাই নিজের নিজের ঘরে গিয়ে যার যার জায়গায় বসেছে। এবার প্রার্থনার ঘণ্টা পড়বে।	
ঘড়ি—এই যে দারোয়ান তোমার পিঠে আবার ঘা দিল, ঢং ঢং ঢং।	আর দুইজন আরম্ভ করিবে।
ঘণ্টা—দেখ, দেখ, ওরা সবাই কেমন হলে এসে জড় হল। এবার প্রার্থনা হবে আর গান হবে।	
ঘড়ি—এর পর পড়ার ঘণ্টা। আমি যখন একটা বাজাব ততক্ষণ পড়া চলবে। তার-পর খেলার ছুটি।	
ঘণ্টা—তারপর আবার পড়া। তারপর যখন চারটে বাজবে তখন দারোয়ান আবার আমায় বাজাবে ঢংঢং ঢং ঢং আর সবাই পাবে ছুটি। দিনের কাজ হবে শেষ।	নিজেকে ঘণ্টা মনে করিয়া ইহার পরের দৃশ্যটি ছাত্র বর্ণনা করিবে।
ঘড়ি—আমার এই ছোট ছোট ছেলেদের খেলাধুলা পড়াশোনা দেখতে বড় ভাল লাগে। তোমার লাগে না? তুমি বুঝি অনেক দিন ধরে দেখছ? হাঁ ভাই, তুমি এখানে কতদিন আছ?	
ঘণ্টা—কি জানি ভাই, কোন্ ছোট বেলায় যে এসেছি মনেই পড়ে না। অনেকদিন থেকে এদের আমি দেখছি—তবু এখনও দেখতে ভাল লাগে।	এইভাবে গল্প চলিবে। এইবার পরস্পরে নিজেদের কাহিনী বলিবে।

প্রয়োগ (Application)

বাড়ির কাজ	শিক্ষক ছাত্রদের বাড়ি হইতে এই কথোপকথন খাতায় লিখিয়া আনিতে বলিবেন।

Lesson—BENGALI GRAMMAR — Lesson No....

Date— — Scheme of Lessons

School— — Method-unit—সমাস প্রকরণ

Class—V. {No. of pupils—27, Normal age—10}

Lesson-units

*1. First Lesson
2. Second Lesson

Time—40 minutes.

* Topic No. 1. forms the day's lesson.

Teacher—

উদ্দেশ্য—সমাস সম্বন্ধে প্রাথমিক জ্ঞানলাভে ছাত্রীদের সাহায্য করা।

প্রথম সোপান—

১। নিম্নলিখিত বাক্যটি বোর্ডে লিখিয়া চিহ্নিত পদগুলি কি ভাবে এবং কিসের নিয়মানুযায়ী পৃথক্ করা যাইতে পারে সে বিষয়ে ছাত্রীদের প্রশ্ন করা হইবে।

উত্তমর্ণের অভিযোগে **দেবেন্দ্র কারাগারে** নীত হইল।

২। মেঘনাদ-বধ কাব্যের নিম্নলিখিত চারিটি লাইন বোর্ডে লিখিয়া উহা কোন্ কবির কোন্ কাব্য হইতে উদ্ধৃত হইয়াছে ছাত্রীদের প্রশ্ন করা হইবে এবং তাহারা বলিতে অক্ষম হইলে বলিয়া দেওয়া হইবে।

"পঞ্চবটী বনে মোরা গোদাবরী-তটে
ছিনু সুখে। হায়, সখি! কেমনে বর্ণিব
সে কান্তার-কান্তি আমি? সতত স্বপনে
শুনিতাম বন-বীণা বন-দেবী করে।"

পঞ্চবটী, গোদাবরী-তটে, কান্তার-কান্তি, বন-বীণা ও বন-দেবী পদগুলি কি উপায়ে পৃথক্ করা যাইতে পারে এবং উহা সন্ধির নিয়মে সংক্ষেপ করা হইয়াছে কি না ছাত্রীদের প্রশ্ন করা হইবে। প্রশ্নোত্তর গ্রহণ করিয়া পদের সংক্ষিপ্ত করণের এই নূতন ধারাকে যে **সমাস** বলা হয় তাহা বলিয়া দিবেন।

দ্বিতীয় সোপান—

নিম্নলিখিত শব্দগুলির সন্ধি বিচ্ছেদ করিতে বলিয়া শিক্ষয়িত্রী ছাত্রী-প্রদত্ত উত্তর বোর্ডে লিখিবেন।

উত্তমর্ণ = উত্তম + ঋণ   নয়ন = নে + অন
দুরাশা = দুর্ + আশা   অত্যুচ্চ = অতি + উচ্চ

নিম্নলিখিত সমাসের উদাহরণ দিয়া শিক্ষয়িত্রী সন্ধি ও সমাসের মধ্যে সাদৃশ্য ও পার্থক্য কি ছাত্রীদের প্রশ্ন করিবেন এবং ছাত্রীরা বলিতে অক্ষম হইলে তিনি উহাদের সহিত আলোচনা করিয়া বলিয়া দিবেন।

দোয়াত-কলম = দোয়াত ও কলম
গুরু-শিষ্য = গুরু ও শিষ্য
শস্য-শ্যামলা = শস্য দ্বারা শ্যামলা
পঞ্চবটী = পঞ্চবট যেখানে সেই স্থান
গোদাবরী-তট = গোদাবরীর তট
বীণাপাণি = বীণা পাণিতে যাঁহার তিনি
অশ্বরথপদাতি = অশ্ব, রথ ও পদাতি

শিক্ষয়িত্রী ছাত্রীদের সহিত আলোচনা করিয়া বোর্ডে সংক্ষিপ্তসার লিখিবেন :—

১। একাধিক পদকে সংক্ষেপে একপদে প্রকাশ করার নাম **সমাস**।
২। সন্ধি ও সমাস উভয়ই **বড়কে সংক্ষেপ** করে।
৩। সন্ধিতে **ধ্বনির পরিবর্ত্তন** হয়।
৪। সমাসে **একাধিক পদের একপদ** হয়।
৫। একাধিক পদের সমাস করিয়া যে এক পদ হয় তাহাকে **সমস্ত পদ** বলে।
৬। সমাসের ব্যাখ্যার জন্য যে বাক্য বা পদগুলি ব্যবহার করা হয় তাহাকে **সমাস-বাক্য, ব্যাস-বাক্য** বা **বিগ্রহ-বাক্য** বলে।

তৃতীয় সোপান—

নিম্নলিখিত বাক্যগুলি হইতে সমস্ত-পদগুলি বাছিয়া সেগুলিকে ব্যাস-বাক্যে প্রকাশ করিতে বলা হইবে।

১। কর্ম্মের রত্ন পরোপকার, ধর্ম্মের রত্ন দয়া।
২। ত্রিভুবনে আমার আত্মীয়-স্বজন নাই।
৩। বাড়ীর ছেলে-মেয়েদের আদর-যত্ন করিও।
৪। ঢেঁকিভানা চালের ভাত খাইলে বেরিবেরি হওয়ার সম্ভাবনা কম।

ঘরের কাজ—

সমাসের চারিটি উদাহরণ লিখিয়া আনিতে এবং প্রত্যেক উদাহরণ লইয়া এক একটি বাক্য রচনা করিতে বলা হইবে।

Lesson—ARITHMETIC

Lesson No.......

Date......

School.........

Scheme of lessons
Method-unit—The First Four Rules applied to Decimals.

Lesson-units

Class V { Number of pupils—30; Normal age—10 }

1. Reading and writing decimals.
2. Addition and subtraction of decimals.
3. Multiplication of decimals.
* 4. Division of decimals.

* Item No. 4 forms the day's lesson

Time—45 minutes

Teacher......

Aim—To exercise reason and judgment of class in the explanation of the process of the division of decimals and to enable them to master the skill.

I. Preparation

Matter.	Method.
Division by an integer (*a*) Find the value of 1 acre of land if 15 acres cost Rs. 77,115	Compare the steps in (*b*) with the corresponding steps in (*a*). Elicit from class the unit that each quotient figure represents. Recall the principle that dividing any number into parts does not change its unit.

```
      Rs. 5141
     ---------
15) Rs. 77115
         75
         --
          21
          15
          --
           61
           60
           --
            15
            15
            --
```

Matter. | Method.

(*b*) Find the value of 1 acre of land if 15 acres cost Rs. 771·15

```
        Rs. 51·41
    ------------
15) Rs. 771·15
         75
         --
          21
          15
          --
          6·1
          6·0
          ---
           ·15
           ·15
           ---
```

II. Presentation.

The principle that multiplying or dividing both dividend and divisor by the same number does not change the quotient applied to:—

Compare the quotients and recall the principle stated in matter.

A. Division of integers

(*a*) How many times is 12 contained in 36 ?

```
12 | 36
     3
```

(*b*) Multiply both dividend and divisor in (*a*) by 2 : How many times is 24 contained in 72 ?

```
24 | 72
     3
```

(*c*) Multiply both dividend and divisor in (*a*) by 10 : How many times is 120 contained in 360 ?

```
120 | 360
       3
```

Matter.	Method.
B. Applied to division of decimals (*a*) How many times is ·2 contained in 2·4 ? Multiplying both the numbers by 10 we change the problem into one of finding how many times 2 is contained in 24	Elicit in each case the number by which the divisor must be multiplied so that it may become a whole number.
2 | 24 → 12	Ask pupils to work out a few examples similar to (*c*) and in co-operation with them formulate the following general principle and put it on the B.B. :—
(*b*) How many times is ·005 contained in ·25 ? Multiplying both the numbers by 1000 the problem is changed into one of finding how many times 5 is contained in 250	To divide a decimal by a decimal, multiply the dividend and divisor by the power of 10 that will change the divisor into an integer ; then divide as in simple division.
5 | 250 → 50	
(*c*) How many times is 2·88 contained in 3·456 ? Multiplying both the numbers by 100 we have 288 and 345·6 and	

```
         1·2
      ------
288) 345·6
     288
     ----
      57·6
      57·6
      ----
```

III. Application.

As in method.

By way of application ask class to work out the following sums :—

Divide (1) 29·21 by 23
(2) 34·3 by 25
(3) 8·454 by ·024
(4) ·5568 by 2·32
(5) ·03096 by 72
(6) ·00281 by 1·405

Lesson—ARITHMETIC

Lesson No....

Date......

School......

Class VIII { No of pupils—40; Normal age—13 }

Time—45 minutes

Teacher......

Scheme of Lessons

Method unit—The principle of reckoning gain or loss by per cent.

Lesson-units

*1. Simple cases of reckoning profit or loss per cent.
2. More difficult cases.
3. Inverse sums on profit and loss.

Previous knowledge—Unitary method and percentage.

* Item No. 1 forms the day's lesson.

Aim--To exercise the reason and judgment of the class in recognising the principle of profit and loss and in mastering the skill of reckoning profit or loss per cent.

I. Preparation.

Matter.	Method.
A. Terms Profit=gain on cost price Loss=loss on cost price Selling price at a gain =cost price + profit Selling price at a loss =cost price−loss.	Begin lesson by questioning class as to name given to gain or loss on any selling transaction and what the gain or loss is always counted upon. To discover gain or loss what must be considered first ? If I sell at a gain, what is my selling price made up of? And if I sell at a loss?
B. Easy oral examples (*a*) If cost price is Rs. 12 and selling price Rs. 15. 10 as. (*b*) If cost price is Rs. 12 and selling price Rs. 9. 10 as. (*c*) If gain is Rs. 3 and selling price is Rs. 18. 10 as. (*d*) If loss is Rs. 2 and selling price is Rs. 10.	Give some of these oral examples to test whether the class understands the meaning of terms and the parts of a selling price in cases of gain and loss.

II. Presentation.

Matter.

A. Why gain or loss is always reckoned by per cent.

I bought a watch for Rs. 20 and sold it for Rs. 25. I bought another watch for Rs. 35 and sold it for Rs. 42. In which of the two transactions my rate of profit was greater?

In the first transaction
selling price $=$ Rs. 25
cost ,, $=$ Rs. 20

profit $=$ Rs. 5

$\therefore$ Profit on Rs. 20 $=$ Rs. 5

,, Re. $1 = \text{Rs.} \frac{5}{20}$

,, $\text{Rs. } 100 = \text{Rs.} \frac{5 \times 100}{20}$

$= \text{Rs. } 25.$

$\therefore$ Profit per cent. $= 25.$

In the second transaction
selling price $=$ Rs. 42
cost price $=$ Rs. 35

Profit $=$ Rs. 7

$\therefore$ Profit per cent. $= \frac{7 \times 100}{35}$

$= 20.$

$\therefore$ The rate of profit in the first transaction is greater than that in the second.

B. The meaning of gain or loss per cent.

(*a*) Seventeen per cent. gain means that if the cost price is 100, then the selling price $= 100 + 17$.

(*b*) Seventeen per cent. loss means that if the cost price is 100, then the selling price $= 100 - 17$.

Method.

(A) Tell class that to compare two or more transactions, all gains or losses must be reduced to a standard cost price and this being fixed at 100, gain or loss is always reckoned by per cent. Draw their attention to the method of calculating gain per cent.

(B) Tell class that when we apply per cent. to gain or loss and say that in a certain transaction there is a gain or loss of 17 per cent., we mean that in every Rs. 100 or £ 100 we have gained or lost Rs. 17 or £ 17; what is the selling price in the event of a gain made up of? And in the case of a loss?

Matter.	Method.
C. Easy Examples 1. If I buy for Rs 100 and sell for Rs. 120, what is the gain per cent.? 2. If I buy for £ 100 and sell for £ 75 what is the loss per cent.? 3. What is the gain per cent., if I sell for £ 105 what I bought for £ 100? 4. What is the loss per cent., if I sell for Rs. 92 what I bought for Rs. 100?	Draw attention of class to the important point that in gain or loss per cent., the cost price is always represented by 100 and the selling price is greater or less than 100 according as there is a gain or a loss.
D. A problem involving loss per cent. Goods bought for £ 5 were sold for £ 4. 10 s. what is the loss per cent.? loss = £ 5 − £ 4. 10 s. = 10 s. ∴ loss on £ 5 = £ $\frac{1}{2}$,, £ 1 = £ $\frac{1}{2 \times 5}$,, £ 100 = £ $\frac{100}{2 \times 5}$ = £ 10 ∴ The required loss per cent. = 10.	Write the problem on the B. B. Question as to how to find loss. What is the loss on? What are we asked to find? What is given and what is required in the problem? Give reasons and analysis of each point in the course of the working of the problem.

III. Application.

Matter.	Method.
As in method.	By way of application ask class to work out the following problems : (1) What is the gain per cent,, if an article bought for Rs. 16 be sold for Rs. 20 ? (2) If an article bought for Rs. 500 be sold for Rs. 450, what is the loss per cent.? (3) If mangoes bought at 25 for a rupee be sold at the rate of 20 for a rupee, what is the gain per cent.?

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Lesson—GEOMETRY

Lesson No.—

Date......

School......

Class—VII {No. of pupils—40, Normal age—12}

Time—45 minutes

Teacher.........

Scheme of Lessons

Method-unit—Angles of rectilineal figures.

Lesson-units

*1. The sum of the interior angles of a triangle is equal to two right angles.
2. All the interior angles of a reflex polygon of n sides $+ 4$ rt. angles $= 2n$ right angles.
3. All the exterior angles of a reflex polygon $= 4$ rt. angles.

* Item No. 1 forms the day's lesson. Previous knowledge—Properties of parallel straight lines.

Aim—To exercise reasoning powers of the pupils and to lead them to discover the construction and the proof of the theorem.

Appliances—A paper triangle.

I. Preparation.

Matter.	Method.
A. Definitions to be stated Triangle—its parts Right angle Straight angle	Ask definitions of triangle, right angle and straight angle. What is a straight angle equal to in terms of right angles ? How many parts has a triangle ?
B. AB and CD are two parallel straight lines and EFGH is drawn across them.	Draw the figure on the B.B. and ask pupils to name all its pairs of alternate angles and exterior-interior opposite angles. Ask if they can state the converse theorem.
C. From any point C on AB draw two straight lines CD and CE.	Ask class to name the angle formed by the sum of the angles ACD, DCE and ECB. What is it equal to in terms of right angles ?

Here announce the day's lesson

II Presentation.

Matter.	Method.
A. As in method	Fix a paper triangle on the board by means of a drawing pin. Bring the angular points together at the middle point of the base by folding and ask class what the sum of the three angles of the triangle is together equal to.
B. Draw a triangle ABC. At C in AC make an ∠ACE equal to ∠BAC.	Draw a triangle ABC on the B.B. Ask class how can each of the two angles BAC and ABC be brought to C and added to ∠ACB. When at C in AC, ∠ACE has been drawn equal to ∠BAC, ask what kind of angles they are and what in consequence is the relation between the straight lines CE and AB. Now ask how the remaining ∠ABC can be brought to C. Elicit from pupils that it can be done by simply producing BC to D.
Produce BC to D.	Ask what the names of the angles BAC and ABC in thier new position are. What do these angles together with the ∠ACB equal to ? What is therefore the sum of the three angles BAC, ABC and ACB equal to. Ask several pupils to re-state the construction and proof.

Application.

As in method	By way of application ask pupils to deduce from the theorem :— 1. In any right-angled triangle the acute angles are complementary. 2. The sum of the angles of a quadrilateral is equal to four right-angles.

———

Lesson—ALGEBRA

Lesson No.—

Date...........

School...........

Class VII { No. of pupils--40; Normal age—12 }

Time—45 minutes

Teacher...........

Scheme of lessons

Method-unit—The nature and meaning of equations

Lesson-units

* 1. Solving equations by the law of subtraction, addition, division or multiplication.
2. Solving equations requiring the use of more than one law.
3. Simple written problems solved by equations.

* Item No. 1 forms the day's lesson.

Aim—To exercise the reasoning powers of the pupils, to lead them to the laws of equations and to develop in them abilities to solve equations using each of the four principal laws.

Apparatus—A balance, a weight box and a piece of stone.

I. Preparation.

Matter.	Method.
As in method	Begin lesson by asking questions of the following type:—
	1. If the price of a book together with Rs. 2 be equal to Rs. 5, what is the price of the book ?
	2. If a piece of rope from which a piece measuring 3 ft. is cut off is reduced to 18 ft. what is the original length of the rope ?
	3. If double the price of a fountain pen is Rs. 24, what is the price of the pen ?
	4. If a quarter of a man's income be Rs. 50, what is his income ?

Here announce the day's lesson and invite pupils to examine the nature of such problems.

II. Presentation.

Matter.	Method.
A. A piece of stone and 20 grammes on the left pan is balanced by 200 grammes on the right pan.	Question class as to what the weight on the left pan will be if the stone weighs x grammes. Elicit from class that in that case $x+20=200$. Tell pupils that such a symbolical statement is called an equation ; that it always has two sides —the left and the right side and that for only one particular value of the unknown quantity the two sides are equal. Let pupils test the last statement. Further tell pupils that the process of finding the value of the unknown quantity is called solving the equation and this process depends on four principal laws.
B. The laws used in solving equations : (*a*) The subtraction law $x+3=9$, $7+x=12$; (*b*) The addition law $x-3=5$, $8-x=5$; (*c*) The division law $3x=15$, $7x=42$; (*d*) The multiplication law $\frac{x}{3}=8$, $\frac{x}{5}=3{\cdot}4$	Explain the laws and show how these are applied to solving equations. Consider equations like $x-12\frac{1}{4}=10\frac{1}{2}$ or $\frac{5}{6}x=10$, and show how such equations can also be solved by the application of the laws. Make pupils orally work out a few examples unaided.

III. Application.

As in method	By way of application write down the following sums on slips of paper and ask pupils to write down the answer against each sum.

Method.

I. Place the answers to the following equations to the right:—

(i) $x+7=20$ ( )
(ii) $3x=9$ ( )
(iii) $x-2=10$ ( )
(iv) $\frac{1}{2}x=5$ ( )
(v) $x-3{\cdot}6=1{\cdot}4$ ( )
(vi) $4x=28$ ( )

II. Check each of the following to determine if correct ; if correct, mark with (C), if wrong, mark with (W)

(i) $x+8=18$, Ans. 10 ( )
(ii) $3x=15$, Ans. 6 ( )
(ii) $x-4=4$ Ans. 6 ( )
(ii) $\frac{1}{3}x=2$ Ans. 6 ( )

Lesson—HISTORY

Lesson No.—

Date.........

Scheme of Lessons

School.........

Method-unit—Career of Sivaji

Lesson-units

Class VII. { No. of pupils—40; Normal age—12 }

Time—45 minutes

Teacher.........

* 1. Achievements of Sivaji up to the murder of Afjal Khan (1630-1659).
2. Subsequent career of Sivaji.
3. Sivaji's Administration

* Item No. 1 forms the day's lesson.

Aim :—To enable the boys to have a clear idea about the achievements of Sivaji up to the murder of Afjal Khan.

Appliances :—

1. Outline Map of India showing the Western Ghats and the Mahratha Kingdom as well as the places conquered by Sivaji.
2. Time-line showing the years 1630-1659.
3. Picture of Sivaji on horse-back.

I. Preparation.

By way of introducing the lesson the teacher will present the Outline Map of India to the boys and ask them the following questions :—

1. What is this country called within and near about the Western Ghats? (Maharastra).
2. By what name are the people of this place called? (Mahrathas).
3. Who was it that made this power so great and powerful in India? (Sivaji).

(Here, the teacher introduces the lesson, and, presenting the picture of Sivaji on hose-back, asks the boys what they see in the picture ; Sivaji is seen in the picture on horse-back, dressed as a warrior and the boys will know how great a soldier and warrior Sivaji was and through what circumstances he came to conquer forts and other places.)

II. Presentation.

(A) In order to give the boys a sense of time of the year of the birth of Sivaji, the teacher, first of all, draws a time-line on the B. B. from the present time down to 1630, the year in which Sivaji was born.

(B) Then, he presents to the boys the time-line of Sivaji's life (up to the year 1659, the year of the murder of Afjal Khan), and will divide the topic into the following three broad heads (to be written on the B. B. and taken down by the boys in their note-books), and will deal with each of them separately :—

I. Early life of Sivaji

II. Conquests ; imprisonment of his father, followed by his subsequent release.

III. Conflict with Bijapur.

(C) The following are the main points on which the teacher will lay stress, when he will discuss the above outline in co-operation with the boys (to be written on the B.B. and taken down by the boys in their note-books) :—

I. Early life of Sivaji :—

(*a*) Sivaji's birth. (Date to be shown in the time-line.)

(*b*) Influence of Dadaji Kanddeo.

(*c*) Neglect of Father.

(*d*) Early companions and their influence.

II. *Conquests and imprisonment of his father :—*

(*a*) Conquest of the fort of Toma. (Date to be shown in the time-line.)

(*b*) Imprisonment of Shahji and his release. (Date to be shown in the time-line.)

(*c*) Conquest of Jawlis. (Date to be indicated on the time-line.)

III. Conflict with Bijapur :—

(*a*) Sending of Afjal Khan against Sivaji.

(*b*) Afjal's attempt to kill Sivaji.

(*c*) Sivaji's murder of Afjal. (Date to be pointed out in the time-line.)

(D) The following developing questions will be asked :—

(1) Under whose care and supervision did Sivaji pass his early days?

(2) How did Dadaji influence Sivaji?

(3) With whose help did Sivaji conquer the fort of Tona?

(4) How did the Sultan of Bijapur try to punish Sivaji?

(5) How was Shahji released?

(6) What are the circumstances that led to the murder of Afjal Khan?

III. Application.

(A) In this step boys will be supplied outline maps of India and asked to point out in the maps the place where Sivaji was born as well as the forts and places which he captured, and to give the years of the birth of Sivaji and the murder of Afjal Khan. The teacher will help the boys by going round the class.

(B) Boys will also be asked the following questions :—

(1) How did Sivaji pass his early days?

(2) How did Sivaji come into conflict with the Sultan of Bijapur?

———

Lesson—HISTORY | Lesson No.—

Date... ...

School.........

Class VIII { No. of pupils 40, Normal age 12 }

Time 45 minutes

Teacher............

Scheme of Lessons

Method-unit—the Civil war and the Commonwealth.

Lesson-units

1. Outline of the Civil war.
* 2. The Battle of Marston Moor.
3. Battles of Newbury and Naseby.
4. Results of the Civil war.

* Item No. 2 forms the day's lesson.

Aim—To exercise imagination of the class and make them interested in the successes and failures at Marston Moor.

Appliances—Map of England, plan of the Battle-field.

I. Preparation

Matter	Method
Progress of the War in 1644. Royalists held North, West and South-west. Ironsides formed in East. Charles at Oxford.	Question class as to the conditions of opposite parties in the Civil War. What parties were gaining ? Why ? Did the Parliamentarians realise their weakness ? Who determined to overcome the difficulty (show map to explain how much of the country was occupied by the Royalists)? What victories were already won by Charles ? Who were leaders on his side ? On opposite side ? By 1644 where was Charles's great stronghold ?

Here announce the day's lesson.

II. Presentation

A. Immediate cause of battle (*a*) York under Graham and Newcastle hard pressed by Parliamentarians.	Tell of success of Ironsides in East, advance of Scotch in North and progress of Rupert in West. Hence position at York dangerous. Message of Charles to

Matter	Method
(*b*) Charles's message to Rupert "Save York, and fight at all costs."	Rupert. Hesitation of Parliamentarians and final resolve to abandon siege and cut off relieving force under Rupert. Result —Meeting at Marston Moor.
(*c*) Siege abandoned and Parliamentarian troops march west to bar the way of relief force.	
B. Opposing forces Cavaliers—Rupert, O'Neil, Newcastle and Goring. Roundheads—Manchester's army (Ironsides, Scotch), Leven's army, Fairfax, father and son.	Draw plan, completing it during course of lesson, and describe the opposing forces ; tell of dispute between Rupert and Newcastle and its issue, also retreat of Manchester's army and its recall on seeing movement of Rupert.
C. Plan of Battle—Position of forces near, only ditch and road between.	From position and plan deduce advantages and disadvantages to each side.
D. Course of Battle Frequent rainstorms. Meeting of Cromwell's and Rupert's forces. O'Neil repulsed. Newcastle roused. Fairfax routed ; Scotch regiment fled, Final rout by Cromwell.	Describe weather, time. etc. Relate the story of the battle in details and show how action of Cromwell saved the day.
E. Result Royalist cause lost in North. Surrender of York and Newcastle. Turning point in Civil War.	What was result to Royalists ? To Parliamentarians ? Which general came out best after battle ?

III. Application

Matter	Method
As in method	By way of application ask the following questions :— 1. Which of the two sides, Royalists and Parliamentarians, had greater advantage? 2. What position of the forces helped the Parliamentarians? 3. What were the causes of failure of the Royalists?

Lesson—PHYSICAL GEOGRAHPY   Lesson No.—

Date......

School......

Class—IX { No. of Pupils—40 / Normal Age—14 }

Time—45 minutes

Teacher.........

Scheme of Lessons

Method-whole — Winds — their cause, direction and effects.

Lesson-Units

* 1. General notions as to cause and direction.

2. Trades and anti-trades

3. Monsoons

4. Cyclone and anti-cyclone

* The item marked with an asterisk forms ths day's lesson.

Previous knowledge—General notions as to distribution of temperature over earth's surface.

Aim—To interest pupils in natural phenomena and exercise their reasoning powers in ascertaining the cause and direction of winds.

Appliances—Diagram of direction of winds from Equator to Poles ; Diagrams showing sea breeze by day and land breeze by night ; Diagrams illustrating Ferrels' law.

I. Preparation

Matter.	Method.
A few questions as in method to elicit the definition that 'wind is air in motion.'	Open lesson by asking questions of the following type :— 1. If you open the window of a very warm room on a cold day, which way does air move ? 2. If a hut is on fire which way does air seem to move ? 3. What happens if you stand at the door of an air-conditioned cinema house on a hot-day and the door is suddenly opened ? 4. What is the name people give to these movements of the air ?

Here announce the day's lesson and invite class to inquire into the cause and direction of winds.

II. Presentation

Matter.	Method.
A. Cause of winds (*a*) Difference of pressure in air owing to { (*i*) Unequal heating. (*ii*) Varying amount of water vapour.	Ask class what happens when a bi-cycle with its pneumatic tyres pumped hard is left in the sun ? Refer to water vapour : vapour being lighter than air bulk for bulk affects pressure.
(*b*) Movement of air to establish equilibrium { Flows from region of high pressure to region of low pre-pressure spirally	Do the experiment with candle held at the partially opened door of a hot room or with table lamp fitted with a card-board T. Elicit that the movement to restore equilibrium is from the region of high to the region of low pressure.
B. Direction What determines general direction. { (*i*) Unequal heating of land and polar regions. (*ii*) Unequal heating of land and water causing alteration of land and sea breeze. { 1. By day and night 2. By seasons	Draw two areas of pressure on the B.B. and question as to the possible direction of the wind. Proceed next to apply and associate same idea to the explanation of land and sea breezes as to why they blow and change at stated intervals (show diagram). Describe the circulation of air currents from Equator to Poles and back again in search of equilibrium (show diagram).
C. How the direction of the wind is changed. (*a*) By shifting of situation of greatest heat. { (*i*) Land and sea breezes. (*ii*) Change of Monsoons.	Refer to land and sea breezes and from them deduce reason of change of monsoons.

Matter.	Method.
(b) In a fixed cycle. { (i) In N. hemisphere N. through E. and S. to W. (ii) In S. hemisphere from N. through W. and S. to E.	Briefly refer to Ferrel's Law explaning how the earth's rotation affects direction (show diagram).

III. Application

As described in method.

By way of application and recapitulation ask the following questions :—

1. Define wind and say how it is caused.
2. Why on a cold day is there a draught inwards from the window of a warm room ?
3. Where do the trade winds really originate ?
4. Why do polar winds creep along the surface of the earth ?
5. Why is Bengal a monsoon land ?

Lesson—REGIONAL GEOGRAPHY

Lesson No.—

Date......

School......

Class IX { No. of pupils—40; Normal age—14 }

Time—45 minutes

Teacher......

Scheme of Lessons

Method-whole—River Basins of South America.

Lesson-units

*1. The Amazon Basin—its physical features, climate and vegetation.

2. The Amazon Basin—its peculiar animals, people and their mode of life.

3. The Panama-Paraguay Basin

Previous knowledge—South America—its position, boundary, coastline and physical features.

* Item No. 1 Forms the day's lesson.

Aim :—To help the boys to form a correct idea of the Amazon Basin, its physical features, climate and vegetation.

Appliances :—(1) Outline maps of S. America showing the Amazon Basin. (2) A physical map of the world. (3) A commercial map of S. America. (4) A rainfall chart of Iquitos. (5) A picture of a South American forest, etc.

Step I :—By way of preparation put the boys questions of the following type :—

(1) What do you require to rub out pencil marks or ink marks from your exercise books?

(2) How do you get this rubber?

(3) What are the places you know about where rubber trees grow abundantly?

(4) To what particular region do all these places belong?

(5) What are the special characteristics of this region?

(6) Can you find out from the map any other such place from which you can expect rubber? (Present the map of the world).

(7) Where is it? What particular characteristics of the place attract your attention most ? (Elicit that the land is interspersed with a network of rivers).

Here distribute among the boys neatly folded outline maps of South America showing the Amazon basin and ask them to find out the name of this river. Then declare the day's lesson.

Step II :—By way of presentation deal with and develop the following sections one by one in co-operation with the boys and write down the main points of each Section on the B.B.—

Sec. A :—The Amazon—its name—size—tributaries.

Develop these points in co-operation with the boys by asking them the following questions :—

(1) Why is the Amazon so called?

(The boys failing to answer this, tell them that the river was named after the women worriors of the ancient fables by the Spanish explorer Orrelans who mistook the warriors of the Yagua tribes living on the Amazon Basin for women, since they wore long hair.)

(2) How does the Amazon compare with other rivers of the world? (Map of the world.) (If necessary, tell them that it is the widest river.)

(3) What are the main tributaries of the river? (the outline maps) (Negro, Yapura, Topajoz, Xingu, etc.)

Sec. B :—In order to develop the physical features of the region put to them questions of the following type :—

(1) Is the Amazon basin a plain land or a high land?

(2) In what direction does this plain extend?

(3) What are the boundaries of this plain land?

(N. Guiana Plateau, S. Brazil Plateau and W. The Andes).

(4) Is the river connected in any way with any others? What are they?

(5) What can you infer from this?

(Here lead the boys to understand that the Amazon Basin was once an extensive shallow sea communicating with the Atlantic by three channels represented by the three rivers, the Orinoco, the Amazon and the Parana-Paraguay; and even now there is inter-communication between these rivers.)

Sec. C :—With a view to leading the boys to understand the climatic conditions of the place put to them questions of the following type :—

(1) Between which parallels of latitude does the Amazon Basin lie?

(2) What type of climate do you expect here?

(3) From your study of the Congo Basin, can you predict anything with regard to the annual temperature and rainfall of this part?

(Daily rain, annual rainfall more than 80″, Average Tempetature above 80°, and range of temperature about 5°.)

Now present the rainfall chart of Iquitos and draw their attention to the January and July isotherms in the outline map; ask them to study both and then put to them the following questions :—

(4) What is the annual rainfall of this region?

(5) Which months of the year experience the heaviest rainfall and why?

(Elicit from the boys that the heaviest rainfall occurs about the time when the sun crosses the Equator. At other times rain is brought by the trade winds which have free entry to this wide plain. Violent windstorms are by no means infrequent. Tell them that throughout a great portion of the Amazon Basin the land is flat and lowly, so that when the river rises, it overflows its banks for many hundreds of miles on either side. So immense is the volume of water carried by the Amazon that the extent of the country innundated is greater than Spain, Portugal and France combined; and the lower Amazon is 50 to 150 miles wide).

What is the annual range of temperatue of this region?

Sec. D :—Then as regards vegetation, put to the boys the following type of questions :—

(1) What are the factors favourable for the growth of plants? How do they affect this part?

(2) From your knowledge of the vegetation of the Congo Basin can you infer anything with respect to the state of vegetation of this place?

(Elicit from them that the Amazon Basin is full of dense, impenetrable jungles with swamps here and there and tell them that this forest land is known as the 'Selvas.' Read at this stage an extract * from the writing of Dr. McGovern who explored some parts of this region quite recently. Present here the picture of the S. American forest.)

(3) Besides rubber trees what other vegetation is to be found and what forest products are got from them? (the Commercial map presented.)

[(*i*) Balata trees—latex resembling a cross between rubber, leather and flexible wood—America greatest consumer ; (*ii*) Brazil (or ivory) nut tress—nuts as hard as ivory—made into some of the best buttons ; (*iii*) Piassaba-bush made into first class ropes and brooms—in great demand. (*iv*) Guarana—a hard berry ground down into powder and taken as a beverage with soda water. These forest-products are collected, sent to Manaos—whence they go down to Para. But ocean-going vessels are able to reach Manaos though situated 1,000 miles up the Amazon.]

Step III :—Now by way of testing the knowledge gained by the boys ask them questions of the following type :—

(1) What, do you think, stands in the way of development of this area ?

(2) How do you account for the presence of a modern town like Manaos in the Selvas?

(3) Compare the Congo with the Amazon.

(4) Rubber being a natural product of the Amazon Basin, how is it that the latter is far hehind the Malay states in Rubber production? etc.

* *Extract* :—"For the next several days we continued our voyage up the main stream. On either side of us was the low lying forest—the river banks being an unbroken wall of trees. As we passed close by the banks, with the jungle right under our noses, the jungle covering the banks seemed more than ever penetrable by reason of the water which covered the roots and

crept far up the trunks of the trees and how thick and entangled the jungle was. Every foot of ground was occupied by trees and the little space left between the tree trunks was covered with bushes, creepers and clinging vines. One had only to gaze at the density of the jungle to realize why it was that the inner fastnesses of the Amazon region had remained so long unexplored. The mystery of the jungle seemed impenetrable. The forests teemed with life, but though from time to time strange sounds came out of them, it was very seldom that we could see anything of the wild creatures that lived there in".

FROM DR. MCGOVERN'S "JUNGLE PATHS AND INCA RUINS".

Lesson—ELEMENTARY SCIENCE

Lesson No......

Date...........

School...........

Class VII { No. of pupils—40; Normal age —12 }

Time—45 minutes

Teacher...............

Scheme of Lessons

Method-unit—Properties of liquids

Lesson-units

1. Pressure of liquids
2. Buoyancy
3. * Archimedes' Principle
4. Floating bodies

* Item No. 3 forms the day's lesson

Aim—To exercise the reasoning powers of the pupils in teaching them the principle underlying the loss in weight when a solid is immersed in water.

Appliances—A bucket and cylinder, a chemical balance, weight box, beaker, wooden bridge, etc.

I. Freparation.

Matter.	Method.
A. Story of Archimedes and Hiero of Syracuse very briefly told.	Introduce lesson by briefly telling class the story of Archimedes but do not explain his clue to detecting the fraud. Ask class to follow it up as the lesson proceeds and return to it at the end.
B. Fluid pressure	Ask pupils the following questions— 1. In how many directions does fluid exert pressure ? 2. In drawing water out of a well does a bucket feel heavier and heavier or lighter and lighter ? When does it feel the heaviest ? 3. Can you give any other instance of upward pressure of water ?

Here announce the day's lesson

II. Presentation.

Matter.	Method.
A. Experiment { (*a*) Weigh the bucket and cylinder out of water. (*b*) Immerse cylinder in water and weigh (*c*) Fill bucket with water Results notified : { 1. After (*b*) found lighter 2. After (*c*) weight same as before. Conclusions :— Apparent loss of weight after (*b*) = weight of equal volume of water to cylinder = weight ot water displaced. Principle stated : A solid immersed in water displaces its own volume of water and loses as much of its weight as is equal to the weight of the water displaced.	Perform the experiment as described in matter. Elicit results and draw conclusions from class and state them in form of principle. In co-operation with class make a three-column B. B. summery under the heads Experiments, Observations (results noticed), Inferences (conclusions).
B. Proof of the Principle :— A B C D is a body immersed in water and in equilibrium. Therefore all pressures on it are equal. But side pressures are equal and opposite and therefore counter-balance. Downwaɪd pres-	Elicit proof from class by asking questions of the following type— 1. What pressure acts on sides and how ? 2. What is the downward pressure of water ? 3. Is there any other downward pressure besides ?

Matter.	Method.
sure=column of water A B E F + weight of body.	4. What counter-balances this downward pressure ?
Upward pressure=column of water D C E F.	5. What is the upward pressure due to ?
∴ A B E F + weight = D C E F.	Draw attention to the fact that this is only true when a body is in equlibrium and that the amount by which a body is lightened in water depends on its bulk.
Take away A B E F from each and weight=column of water A B C D=weight of water displaced.	

III. Application.

Matter.	Method.
A. How Archimedes discovered the fraud.	Elicit from class how Archimedes discovered the fraud by asking questions of the following type:— 1. Which is the heavier of the two metals gold and copper? 2. Which of the two lumps of gold and copper of equal weight has the greater bulk ? Which of them will displace more water when immersed in it ? 3. If the crown displaced more water when immersed in it than a lump of gold of equal weight, what did it signify ?
B. As in method	Further by way of application of the principle ask questions of the following type :— 1. If a body is immersed in a beaker full of water, how much water will come out ? 2. If cylinders of different metals having the same bulk are weighed in air and water respectively, will the loss in weight be the same in each case ? If so why ? 3. Why does a ship draw more water in a river than at sea ?
C. Home-work	Describe the experiment performed and sketch the appratus used.

Lesson—ELEMENTARY SCIENCE   Lesson No.—

Date........

School........

Class IX { No. of pupils—40
Normal age—14

Time—45 minutes

Teacher........

Scheme of Lessons

Method-unit—Asocial Insects

Lesson-units

1. The mosquito
*2. The butterfly
3. The butterfly and the moth—a comparison.

* Item No. 2 forms the day's lesson.

Aim—To train the pupil's power of observation by leading them to examine the butterfly, and take an interest in nature.

Aids—Specimens of four stages of a butterfly; large diagrams showing these stages.

I. Preparation

Matter	Method
Life History of a Butterfly Four stages but Two Lives: 1. Egg. 2. As a grub living on leaves and eating much. 3. Transition stage: chrysalis 4. As a beautiful winged insect flying from flower to flower	Begin lesson by showing large diagrams of a butterfly in all its four stages asking class what they see and where they will find each. Ask how many kinds of lives a butterfly has and draw pupils' attention to the contrast between the ugly caterpillar and the beautiful butterfly. Compare with the mosquito in the number of stages and kinds.

Here announce the day's lesson.

II. Presentation

Matter	Method
A. Life as a catterpillar	Draw pupils' attention to the caterpillar and ask all they notice about its body :—
(a) Description : Body : Long, soft, and ringed; with or without hairs (use): breathing holes behind each ring (no lungs)	What creatures does it resemble? Insects or worms? Are all caterpillars the same in appearance and colour?
Head : Small, black, shiny, strong jaws (why?) Eyes : Very small, at top of head.	Of what use are the tufts of hair on the back? What kind of head? Why such strong jaws? How many feet? How are they located? Contrast with the butterfly as to number and position.
Feet : Three pairs, long and pointed, behind the head (correspond to legs of butterfly, hence true legs); four pairs, trumpy ones (pro-legs) and two more at tail (claspers).	Lead class to see that the four back pairs are necessary to support the long body but unnecessary to the butterfly. Call attention to the hind ones and show how they grasp.
(b) Habits : Food, eats fresh leaves greedily (pest of gardens).	Ask how it breathes; show breathing holes; contrast with the larvœ of mosquitos, higher animals and fishes.
(c) Moulting: Reason for and mannei of change of skins, *cf.* moulting of lizards or snakes.	What does the caterpillar live on? Contrast with butterfly as to quality and quantity of its food.
	Why does the caterpillar moult? Ask if any of the pupils knows how raptiles increase in size.
B. Transition stage : Chrysalis	Describe transition stage. Let class contrast the chrysalis with the caterpillar as to appearance, food and movement. By pointing to the markings in an enlarged diagram elicit from class that the chrysalis is more of a butterfly than caterpillar. Ask what goes on during the chrysalis stage and how the butterfly escapes from its prison. Point out to class that if pupation takes place in Summer the butterfly wll emerge in 2 or 3 weeks; but if pupation takes
(a) When full size is reached, new eyes, legs and mouth begin to form under the skin. After moulting for the last time a chrysalis emerges and hangs head down from a leaf, a hard shell or a silken web covering its delicate body.	
(b) contrast the chrysalis with the caterpillar as to skin, food and movement.	

Matter	Method
(c) Parts of butterfly inside the chrysalis. How skin is hardened. How after a few days the butterfly bursts through its prison walls.	place in Autumn, the pupa hibernates till the next spring. The fact that the pupa is still alive can be proved by tickling the abdomen which responds by little jerks.
(d) There are two generations per year and the life cycle may be summarised thus :— Hibernating pupa→Butterfly in Spring → Egg → 10-15 days→ caterpillar → pupa in Summer →2 to 3 weeks→Butterfly→Egg →caterpillar → Hibernating pupa.	
C. Description of Butterfly (a) Four large beautifully coloured wings. (b) Six long legs. (c) Eyes large and projecting, why ? (d) Two long antenna (use). (e) Sucking trunk (suited for flowers) (f) Body, slender and light.	Let class describe it from diagram or an actual specimen. Question as to the use of each part and contrast with first stage. Discuss its habits. Tell them that they lay eggs before they die and ask where they are likely to do so.

III. Application

As in methad.

By way of application ask questions of the following type :—

(1) Where does the butterfly lay its eggs and why ?

(2) Contrast the legs of the caterpillar with those of the butterfly as to number and position. What purpose do the prolegs serve ?

(3) While the caterpillar has strong jaws, the butterfly has a coiled sucking trunk. Why ?

(4) Contrast the breathing organs of a caterpillar with those of the larva of a mosquito.

(5) How does the caterpillar grow ? How does it build its silk hoop when the time for pupation comes ?

Lesson—HYGIENE	Lesson No....
Date.........	Scheme of Lesson
School.........	Method-whole—The Sense organs
Class VII. { No. of pupils... / Normal Age...	Lesson-units 1. The Eye *2. The Ear 3. The Nose 4. The Tongue 5. The Skin
Time—45 minutes	
Teacher.........	* The topic marked with asterisk forms the day's lesson.

Aim :—To enable the boys to have clear ideas about the structure and the function of the organ of hearing.

Step I.

Appliances :—A model and a picture showing the structure of the Ear, a glass tube representing a semicircular canal and a pointer.

Step I.

By way of preparation ask the boys questions of the following type :—

1. What is the chief seat of sensation ?
2. How many sense organs have we got ?
3. What are their respective functions ?
4. Which is the best medium for the propagation of sound ? (Solid materials.)

Now present to the class the model of the Ear and announce the day's lesson.

Step II.

Draw the picture of a human ear on the b. b. part by part (external, middle, internal) and with the help of the picture drawn on the b. b. and the model, present to the class all the facts connected with each of those parts in a connected and systematic form.

(The facts must be presented in as practical a manner as possible, as for example—while explaining the function of the

Eustachian Tube, the pupils may be asked to blow very hard with their mouth and nose cavity closed and thus experience the pressure, produced thereby, on the Tympanic Membrane.)

A.

(*a*) The External Ear—consisting of the Pinna and the Auditory Canal.

(*b*) The Middle Ear—a small irregular cavity—separated from the auditory canal by the Tympanic Membrane and containing a chain of three movable bones, *viz.*, Malleus, Incus and Stapes.

(*c*) Internal Ear—consisting of a very complex cavity and containing the Membranous Labyrinth, surrounded by a fluid called perilymph, which again consists of three parts, The Vestibule, The Semicircular Canals and The Cochlea.

Questions to be asked after the presentation of this group :—

1. What are the different parts of the external ear ?
2. What is the position of the drum in the ear ?
3. What are the parts of the middle ear ?
4. What are the parts which go to constitute the internal ear ?

B.

(*a*) The External Ear—receives sound waves which impinge against the Drum,—the Drum communicates its motion to the chain of small bones of the Middle Ear. The chain of bones again communicates the vibration to the Cochlea of the Internal Ear through the vestibule. The hair-like processes of the cells forming the organ of Corti receive the sound waves from the fluid inside the Cochlea and send it to the Cortex of the Brain through the fibres of the Auditory Nerve.

(*b*) The Eustachian Tube helps to equalise the air-pressure on the two sides of the drum and the semicircular canals maintain equilibrium.

Now ask questions of the following type :—

1. What is the function of the external ear ?
2. What purpose does the drum serve ?
3. What is the function of the chain of bones in the middle ear ?

4. What is the utility of the eustachian tube ?
5. What is the function of the internal ear ?
6. What do the semicircular canals do ?
7. What is the function of the cochlea and the fluid in it ?
8. What part does the brain play in the process of hearing ?

Write down on the b. b. the most important points from the answers elicited from the boys when the lesson is in progress. This will give a B. B. summary.

Step—III.

By way of application ask the boys questions of the following type :—

1. What would be the result if there were no semicircular canals ?
2. How can you know that the semicircular canals have got nothing to do with the process of hearing ?
3. What would have happened if there were no eustachian tube ?
4. Why is it not possible for us to hear in a vacuum ?
5. How does a sound wave reach the brain ?

Home-task :—

Ask the boys to draw a picture of the ear and show by arrows the course of the sound waves (from the atmospheric air to the cortex of the brain).

N.B.—For convenience of printing lines shown in the lesson-plan blank as well as diagrams, sketches, battle-plans etc., have been omitted.

ERRATA

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Page	1	line	15	read	lesson-plan	in place of lesson plan
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,,	91 (foot-note)			insert	after the sentence the following new sentence:—In the lesson-notes abbreviated language has been used.	

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